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'What Do You Do With An Idea?' Differentiating A Fourth -Grade Reading Curriculum Using Gardner's Theory Of Multiple Intelligences

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‘WHAT DO YOU DO WITH AN IDEA?’

DIFFERENTIATING A FOURTH-GRADE READING CURRICULUM USING GARDNER’S THEORY OF MULTIPLE INTELLIGENCES

by

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Professor Spring:
You showed me that teaching and learning can take place
through artistic expression,
on adventures,
in books,
through experiences,
with others,
outside,
by questioning,
through exploring,
constructing,
reflecting.
Thank you for creating a classroom environment where curiosities and differences were respected and encouraged. You valued your students for their unique gifts, and in turn set an example that inspires me to do the same.

Amo: volo ut sis. “I am determined that you can be (anything you can be).”
– Saint Augustine

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CHAPTER ONE

Introduction

Inspiration

Amo: volo ut sis. "I am determined that you can be (anything you can be)." Professor Arthur Spring, one of my undergraduate education professors, inspired me with the above Latin phrase. He saw in each of his students a human spirit with an ability to learn and become the fully actualized version of ourselves. Professor Spring knew us, challenged us, and made us think; he appealed to each individual's interests and learning styles to maximize our talents. In turn, this taught us how to recognize and engage the unique gifts in each of the hundreds of students we would encounter in our careers.

On the first day of class, Professor Spring gave us an assignment to depict the break of day however we wanted to represent it in a medium of our choosing. He did not explain why. I was curious and excited! Why did an upper-division college student get to do art for a social studies pedagogy class? The above assignment was something fun and different than typical classes. I went home to my dorm room, got out my oil pastels, and drew the best sunrise I knew how. The next day, we all came to class with our creations. Some students had used colored pencils, others painted with watercolors, and a few made collages. We shared our depictions, why we made them as we did, and posted them on the classroom walls. Then we were assigned to create a blackbird. Again, I went home to

my oil pastels, but I did not know how to draw a blackbird, so I had to do some research. When the time came to share in class, what struck me was the variety. Some were realistic while others were more abstract, but each represented what a blackbird meant to that student. The breaks of day and blackbirds remained posted in the classroom the entire semester—constant reminders of how different and talented we each were.

Professor Spring's class was filled with variety. We went on adventures—on one occasion we walked to a nearby chestnut tree where we analyzed the shell and core of a chestnut, wrote poetry about our outdoor learning experience, and read about chestnut trees and their relationship to Abraham Lincoln. We went to political speakers or Taizé prayer and discussed our experiences in class. Often, we went to the library, found a section that interested us, and read whatever we could. There were also days when we read a chapter in our book, looked up the definitions of unfamiliar words, and created visual depictions of the text. Professor Spring provided a wide range of learning experiences that tapped into many different modes of learning. He not only taught in ways that reached the different learners in his class, but he also expected us to do the same and engage our future students in a variety of ways.

For our final practicum in Professor Spring's class, we were tasked with putting on a fair about Mexico for elementary students at the nearby lab school. I found *Dia de los Muertos* fascinating in its spiritual connection to people of the past and relationship to my experience of All Saints Day. We came to class with our ideas and categorized our information. My group's focus was Mexican celebrations. We researched and planned and returned with three different books about *Dia de los Muertos* and accompanying lessons. Professor Spring listened to our ideas and challenged us to instead find

celebrations that took place closer to the time of the fair: mid-December. My group went on a mission and found *Las Posadas*, a nine-day celebration leading up to Christmas. We again found children's literature and again outlined a lesson plan—and yet again, he challenged us: how can you make your lesson more interactive? How can your students experience *Las Posadas*? After some more research, we decided to take our students on a journey with Mary and Joseph to nine different inns that led to the baby Jesus. We brought this idea to Professor Spring and this time he said, "Yes!" I believe he had this in mind all along, but he challenged us and guided us with questions and let us go through the process of finding and creating the most relevant and engaging lesson for the students.

The time came for the fair, and the entire elementary student body rotated through different stations to discover many aspects of Mexico in a wide variety of ways. Students played money games to learn about Mexican currency, listened to a story about Miquel the swordfish to learn about the geography of Mexico, created sculptures to learn about art and animal life in Mexico, and actually participated in *Las Posados*, a nine-day celebration leading to Christmas.

Professor Spring's class, including putting on this fair, inspired me and allowed me to understand that learning does not solely consist of reading about a topic such as Mexico in a book and writing about it. Rather, there are innumerous ways to learn and just as many ways to show what you have learned.

Research Question

Throughout my thirteen years of teaching, I have witnessed the many wonderful qualities and individual ways of learning students bring to school each day. In the reading classroom alone, students come with varying levels of fluency, comprehension, interests,

and expression. As a fourth-grade teacher, I would like to enhance the reading curriculum for my students by tapping into their natural talents and allowing them to learn and show what they have learned in personal and individually relevant ways. To accomplish that goal and build such an environment, this capstone project investigates the question, *"How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?"*

Background

I grew up in a home where both parents—my mom a daycare provider and dad a building contractor—used our house for their businesses. I witnessed the hard work, thought, and effort that went into doing what they loved. They collaborated in designing and building indoor and outdoor spaces conducive to enriching the minds and lives of children ranging in age from as young as six weeks old up to school-age students who returned each summer.

My mom was always coming up with creative ways to help her daycare children—including my sisters and me—learn: songs and rhymes with actions; stories with interactive elements such as felt board characters or puppets; explorations with rice, sand, and water tables; painting with pudding, shaving cream, and tempera paint; creative play with dress up clothes and props; large motor development with tricycles, swings and jungle gyms; imaginative adventures to space, Hawaii, and more. I was constantly engaged with the variety of learning opportunities. Once old enough, I started helping my mom with the daycare children after school and during the summer. I loved their energy, imagination, and curiosity.

Throughout my formal education, I have had some exceptional teachers and learning experiences. My first-grade teacher noticed my strong interest and skill in math and arranged for me to attend math class with students a grade above me. The same thing happened in reading once I reached fourth grade and continued throughout my elementary years. My teachers ensured I was appropriately challenged. In middle school, Mr. Franke expanded my perception of learning in the Science classroom. We walked a block to the Mississippi River, retrieved water samples, tested the acid levels, and then discussed our environmental impact on water resources. We built Rube Goldberg machines in pairs and combined them as a class to form one long machine that stretched the length of the cafeteria. We also learned the scientific process through the creation of different airplane prototypes. Again working with partners, we researched different airplane models, built airplanes, made predictions, tested our airplanes, and then improved them before repeating the test cycle. Although my partner and I built an extremely heavy airplane with limited flight capabilities, I valued the experience and still recall the most successful flyers as being made of balsa wood. I really enjoyed Mr. Franke's experiential, hands-on approach to teaching Science. Sister Clare, another talented teacher who I had for eighth-grade English, was known for her high expectations and high-energy classes. She used visuals, sayings, and mnemonic devices to help us learn. When she noticed we needed a mental or physical break, she had us stand and sing "High Hopes," which immediately improved the mood within the classroom. In high school Theology, Mr. Heymens required us to think like philosophers and theologians by promoting and provoking thinking and questioning. Mr. Karn's exercises in deconstructing sentences will forever impact sentence fluency in my writing. From my

earliest memory of learning as a child to my high school experiences, I had some dynamic teachers who altogether influenced my interest in taking education classes at the College of Saint Benedict.

I started college as an elementary education major with a concentration in mathematics and remained on the same path throughout my four years. I continued to have quality teachers who I respected and looked to for expertise in the field. I found value in the required lower division classes: childhood development, educational psychology, children's literature and more. They laid the foundation for my upper division pedagogy classes where I could apply what I learned to my practicum experiences in elementary and middle school classrooms. I recall teaching sixth-grade students about erosion through hands-on experiments; teaching language arts to third graders using *The Great Kapok Tree* by Lynne Cherry with choral readings and environmental thinking and letter writing; singing multiplication raps and using manipulatives to teach patterns and arrays in math with third-grade students; and, of course, putting on a fair about Mexico for all elementary students with Professor Spring for my Social Studies practicum. I spent hours researching, creating, and rehearsing my lessons before going into the classrooms for my practicums and it all paid off in the experiences I had teaching a variety of learners at different grade levels. I finished my last semester of college student teaching in both elementary and middle school settings. My first eight weeks were at a public elementary school in a second-grade classroom. My cooperating teacher was highly regarded, as many teachers in the building and district looked to her for ideas and advice. I felt lucky to have had such a talented mentor. I

concluded my student teaching in an algebra classroom at a public middle school. From these two experiences, I learned I prefer teaching within an elementary school.

Immediately after college, I taught second grade for three years at a parochial school, which was ideal given I had just finished student teaching in a second grade classroom. My prior experience teaching seven- and eight-year-olds gave me the skills and confidence I needed to survive and enjoy my first years of teaching. The other teachers in my building felt like family, encouraging and supporting me along the way. Despite my love for teaching second grade and strong connection to the teachers at my school, I was ready for a new adventure in a different location.

I interviewed at a few schools, but had a special feeling when I walked into what would soon become my new school. As I entered the building, a parent asked who I was and why I was there. Within a few minutes of conversation, we learned we went to the same middle and high school and had some of the same wonderful learning experiences. It was the connection I needed to have a good interview and positive first impression of the school. A few days later I was offered a job teaching fourth grade. A few months later, I learned I would have the daughter of the parent I met when I first came to the school. I embarked on a new adventure.

When I first started teaching fourth grade in 2006, I had students reading beyond, on, and below a fourth-grade reading level so I differentiated the reading curriculum to meet the needs of my students. I conducted literature circles with students grouped according to reading level, and each group chose its own book. At the end of the unit, I gave my students a variety of final project options. One group of readers chose to write a song about the plot of the story and then turn it into a music video. They had costumes

and props and recorded the song and video onto a DVD. Their final project demonstrated they understood the content while at the same time showed their creative skills. I was impressed with both the enthusiasm the group showed toward the project and their final product itself.

Despite the success of the literature circles, in my second year of teaching, I did not give reading the attention that I had the previous year. In the summer of 2007, my school had focused on creating math targets, common assessments, and meeting the needs of all students in math. To help accomplish the above goals, a designated time on Wednesdays called PLUS time was established, wherein teachers were given additional support to help meet the math needs of our students. It was great in theory, but in actuality, the time it took to plan did not match up with the outcome of student performance. Instead of devising creative reading lessons, I spent most of my planning time figuring out what to do when students mastered or did not master math targets. As a result, I resorted to using the basal reading program as my primary resource with little differentiation. I observed students' lack of energy and enthusiasm for learning reading, making for a flat, uninteresting, and unfulfilling experience.

PLUS time did not continue the next year, which provided me with more time to plan my reading instruction. I was determined to again differentiate in the reading classroom. I created independent research opportunities as well as project ideas for students to do with the theme of each unit. The experience closely matched that of my first year, with a clear return of the excitement, which had previously made reading so much fun. I was pleased to see the enjoyment my students had in reading and presenting

their findings to the class. The quality of their work supported my belief in offering differentiated activities to readers and I was determined to do so each year thereafter.

In 2011, I moved from teaching fourth grade to third grade. I wanted to add more tools to help me teach a new grade level, so I explored tiered assignments, Multiple Intelligences, flexible grouping, inquiry-based research, project menus, and teacher-directed spin-offs. Of all the approaches I used, I especially liked weaving Gardner's Theory of Multiple Intelligences into my lesson plans because it provided variety and tapped into the different strengths of my students.

Now, in 2015, I am back to teaching fourth grade. Within my school, there is a special education consultant; students who have learning disabilities work with her. However, not all my students who struggle in reading qualify for those services, and I must meet their needs in the general curriculum. On the other end of the spectrum, my school offers enrichment courses to certain students who are doing well academically. While some of my students participate in reading enrichment, I still have a diverse group of readers who remain in my classroom for reading and I am responsible for creating an environment that allows each child to learn and grow. In order to for this to happen, I must recognize and tap into the unique needs of each of my students. I want to use what worked during my first run teaching fourth grade, combine it with what I learned teaching third grade, and build upon both to further differentiate my fourth-grade reading curriculum using Gardner's Theory of Multiple Intelligences.

In Practice

Last year, my class organized a poetry reading called Sugar Rushin'. They voted on a student-created title and built the entire event around it. Students wrote poetry—

often Sugar Rushin' related—and then illustrated their poems using an interactive whiteboard. The class designed Sugar Rushin' wrappers to cover pre-made candy bars as refreshments for parents and guests who attended the poetry reading. They decorated the room with Sugar Rushin' artwork hung on the walls and from the ceiling. My class even worked together on entertainment for intermission. They wrote and performed a skit wherein some students were dressed as Sugar Rushin' candy bars trying to advertise their products. These student-sized candy bars passed out their wares to another group of students who pretended to be toddlers. Upon eating the bars, the toddlers were immediately filled with boundless energy, making it difficult for their "parents" to reign in their enthusiasm and resulting in wild—and of course, planned—chaos. A newscaster interviewed the Sugar Rushin' candy bars, sugar-filled children, and exhausted parents to capture the day's energetic events. This skit was pre-filmed to show at intermission.

On the day of the poetry reading, student hosts greeted guests with a student-made program and ushered them to the seating area. The poetry reading opened with the entire class reciting "Sugar Rushin'," a poem written by a few of my students. Thereafter, each student introduced himself or herself, and recited the poem with the handmade slides projected in the background. Two students were the stage managers responsible for changing the slides. Other students took photographs of the event while yet another filmed. At intermission, the Sugar Rushin' skit was shown to guests while they enjoyed the Sugar Rushin' candy bars. The second half consisted of more students and their poetry. Students, parents, and guests left with smiles on their faces.

Everything about the poetry reading was led, designed, and executed by my students within a loose framework that I provided to them: establish a theme; write,

illustrate, and share individual poems; be creative and expressive; apply for jobs that interest them; work together; and enjoy poetry. Once the class voted on a theme and I modeled how to compose different types of poetry, ideas spilled from their minds. Students took ownership of their roles and contributions and were proud of their work. Each student was able to contribute and express his or her unique talents and interests all while learning about poetry. This wide-ranging approach demonstrates, to me, teaching and learning at its best.

Chapter Summary

I believe each student comes to school with a unique set of gifts and talents. It is important that I acknowledge and foster these strengths throughout the school day while still paying close attention to areas that need improvement. In Chapter Two, I explore resources to inform me on differentiated instruction practices in the classroom and Gardner's Theory of Multiple Intelligences.

CHAPTER TWO

Literature Review

Introduction

In this chapter, I will explain what I believe the role of a teacher is, describe differentiation in the classroom, and explore the concept of and rationale for applying Gardner's Theory of Multiple Intelligences (MI). Researching these topics will help answer my question: *"How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?"*

Teacher as Decision-Maker

Beyond the theories of thinking and learning, psychology of human development, and pedagogies of teaching, I think "Teacher as Decision-Maker" is one of my main takeaways from my undergraduate work at the College of Saint Benedict/Saint John's University. There are many factors that go into planning a lesson, unit, day, and year: classroom management, curriculum standards, a variety of learners, my personality style, and more. At the end of each day, after considering all these factors, I am responsible for the decisions I make as teacher.

In most cases, I believe my students construct knowledge by doing or through discovery—traits commonly associated with a constructivist approach to learning: a belief that meaningful information is constructed by students rather than given to them.

Constructivism, previously known as progressive education, was derived from the work of John Dewey, who is considered the father of constructivism. He believed in child- rather than teacher-centered instructional practices where learners construct their own information and knowledge. The thinking behind a constructivist approach is supported by cognitive development theories such as those of psychologists Jean Piaget, Lev Vygotsky, and Jerome Bruner, who explain the importance of constructing meaning. They believe truth and meaning are not given to a child; rather they are discovered and created by the child. (Lefrançois, p. 229). This approach stresses and values the cognitive abilities of my students, which, unlike the more homogenous assumptions of behaviorism, emphasizes that each student derives different meanings from experience. As Lefrançois (1999) notes:

> Constructivism does not imply that teachers need do nothing to facilitate learning—that the learner should assume complete responsibility for acquiring and organizing information. But it does imply that teachers need to be keenly aware of the learner's capabilities, of what the learner already knows, of what is likely to be meaningful and interesting. In the constructivist classroom, the role of the teacher is to promote the child's view. (p. 100)

Within a constructivist approach, students can make meaning by what they are doing.

As a teacher, I value students and their involvement in their own education. This viewpoint is considered student-centered, which is based on a philosophy of self-discovered learning. Within this constructivist and humanist way of thinking, teachers must show genuine care for students as individuals (Lefrançois, 1999). As Webber (2011) observed, valuing students and embracing this learner-centered approach allows teachers

to spend more time developing an environment that empowers students to construct knowledge and focus less energy on the transfer of factual knowledge (as cited in Limbach & Waugh, 2011, p. 95). I also believe that a student-centered classroom promotes active rather than passive learning. This shift to active learning strategies is ideal, as Smart and Csapo (2007) argued. Students will be more engaged, learn more deeply, and develop a greater ability to solve problems and think critically (as cited in Limbach and Waugh, 2011, p. 95).

Although providing opportunities for students to construct knowledge through discovery is important in my classroom, there are situations where direct instruction may be a more suitable approach to teaching and learning. I encounter so many different learners; I need to be able to teach those learners with varying approaches. Knowing my students and their learning needs enables me to reach into my toolbox of strategies and make the best possible decisions. As I continue to learn and grow through my experiences, I continually evaluate and reflect on my practice as teacher and make decisions to improve my craft.

Differentiation in the Classroom

In one-room schoolhouses during the 19th and early 20th centuries, teachers were expected to teach students in a variety of grade levels within one school day, within one building. In some ways, teachers are still required to accomplish the same task of teachers in the past (Tomlinson, 1999). Although most teachers are not expected to teach elementary, middle, and high school all in the same room, they are expected—required, even—to meet the needs of a variety of students and their unique abilities and learning styles. As discussed below, education research has been trending toward individualized

learning for decades. Advocates for redesigning public education in recent years have emphasized personalized learning (Robinson, 2009; Wagner, 2008; as cited in Tobin & Tippett, 2014). In fact, in 2004, reauthorization of the Individuals with Disabilities Education Act (IDEA) introduced Response to Intervention (RTI). RTI assumes literacy teachers individualize their instruction as a matter of course, within both the context of the general classroom and within the context of more specialized and targeted instruction/intervention (Watts-Taffe et al., 2013).

Definition

In order to meet the diverse needs of their students, teachers must appropriately differentiate their instruction. To do that, teachers need a practical understanding of what differentiation is, beyond the more general terms of personalized or individualized instruction and learning. Tomlinson (1999) defined differentiation as "an organized yet flexible way of proactively adjusting teaching and learning to meet kids where they are and help them to achieve maximum growth as learners" (p. 14). Similarly, as noted by Robb (2013), differentiation "is a method of teaching that asks teachers to know their students so well that they can respond to individual needs and provide tasks and learning experiences that move each student forward" (p. 14). A teacher who takes this approach will eventually find that "a truly differentiated classroom is one in which learners are understood to be constantly growing and changing as they participate" (Watts-Taffe et al., 2013, p. 305).

Why Differentiate?

The most intuitive reason for a teacher to differentiate is simple: every child learns differently, and since every child is different, the most effective instruction is

designed to fit each learner (Connor et al., 2011; as cited in Watts-Taffee et al., 2013). This implicit acknowledgement of individualism means that differentiated instruction is also central to honoring all sorts of diversity, from cultural and economic differences to individual learning styles and student traits (Watts-Taffe et al., 2013). Hall, Strangman, and Meyer noted that differentiated instruction provides entry points, learning tasks, and outcomes tailored to students' learning needs. This allows all students to access the same classroom curriculum (as cited in Watts-Taffe et. al, 2013). Beyond this intuitive reasoning, teachers also need to gain a deeper understanding of the ways human psychology plays a role in the classroom, as recognizing stages of cognitive development in their students will allow teachers to design and implement effective lessons. Tomlinson (2003) described three larger principles for differentiating effectively and four specific student traits to consider. I will begin with the three principles as follows: intelligence is variable, the brain hungers for meaning, and humans learn best with moderate challenge.

Intelligence is Variable

Brain research explains that each student's brain is unique, and teachers must provide many opportunities for learners to make sense of ideas and information (Tomlinson, 1999). Differentiation requires flexibility and teachers need to remember that instruction is not "one size fits all" (Heacox, 2002). That is, students should have opportunities to make choices about how they will learn and how they will show what they have learned based upon their unique mix of talents and interests. The constructivist approach to student-centered learning blends cleanly with the idea that students can access and understand one topic in a multitude of ways. Collay, Dunlap, Enloe, and

Gagnon (1998) note, “Learners need to take stock of what they already know about something as a bridge to new learning” (p. 38). Helping students consistently make these sorts of connections through whatever means possible has positive results. As Melton, Pickett, and Sherer (1999) wrote, “Students will learn most effectively when they are actively involved and invested in the education” (Introduction section, para. 5). Understanding and acknowledging variation in intelligence can be a boon to teachers, especially in a discipline as traditional as reading: there is research that indicates teachers have a greater likelihood of meeting the needs of students who find literacy learning challenging when they use differentiated practices (Tobin & McInnes, 2008).

The Brain Hungers for Meaning

A meaningful curriculum should be of high interest and high relevance to students and tap into their experiences. As Tomlinson (1999) wrote, “If we want students to retain, understand, and use ideas, information, and skills, we must give them ample opportunity to make sense of, or ‘own,’ them through involvement in complex learning situations” (p. 19). This sense of ownership appeals directly to the idea of students constructing knowledge for themselves and driving their own education forward. Therefore, “an extremely important role of caregivers involves efforts to help children connect new situations to more familiar ones” (Bransford, Brown, & Cocking, 1999, p. 92). In facilitating the learning process and in helping students make these connections, it is also important that teachers keep differentiated instruction relevant, focusing on what is essential for students to learn (Heacox, 2002). The learning process, ultimately, is a “willful, intentional, active, conscious, constructive practice that includes reciprocal intention-action-reflection activities” (Jonassen & Land, 2000, p. v).

Humans Learn Best with Moderate Challenges

I believe that students learn best when the tasks provided to them pose a moderate intellectual challenge. When tasks are too difficult, students can feel threatened and shift into self-protective modes, or worse yet, feel defeated (Heacox, 2002). Melton et al. (1999) also state, "Learning comes about best when we are challenged but not threatened" (Cognitive Ability section, para. 3). Lawrence-Brown (2004) cautions us to be aware of the converse: "Care must be taken that, in our efforts to meet the diverse needs found in heterogeneous classrooms, we do not import problems of homogeneous classrooms such as debilitating low expectations for some students" (p. 38). That is, if students do not have to put forth much effort in their learning, they may not learn the skills necessary to handle future challenges. The balance of providing students with appropriately challenging tasks is stated quite eloquently by Lefrançois (1999):

> Learners need to be provided with experiences that are familiar enough that they can understand them; they also need to be challenged so that they will be forced to accommodate. The result, ideally, will be the construction of new understanding (accommodation) on the back of old learning (assimilation). Providing learners with an optimal level of difficulty presupposes that teachers know their level of functioning, their interests, and their capabilities—hence the fundamental importance of understanding how children think. (p. 101)

Therefore, the tasks given to each student must appropriately match his or her learning level, or as Lawrence-Brown (2004) states, "All students benefit from the availability of a variety of methods and supports and an appropriate balance of challenge and success" (p. 37). The application of this principle of providing moderately challenging learning

opportunities directly applies to the reading classroom: “Students who spend most of their reading practice in books that are too easy or books that are too difficult fail to make the reading gains possible when reading books that are appropriately challenging” (Baker & Wigfield, 1999; Anderson, Higgins, & Wurster, 1985; as cited in Sanden, 2012, p. 226). Robb (2013) explains just how important reading success is beyond the classroom, asserting that “struggling readers and writers, whether English is their first or second language, deserve opportunities to improve their skills so they can read and comprehend and write and communicate well” (p. 20).

Let us now consider the four student traits teachers should address to ensure effective and efficient learning: readiness, interest, learning profile, and affect (2003) Of note, in more recent publications, Tomlinson has moved affect to a group of classroom elements upon which a teacher can differentiate instruction. I prefer her earlier inclusion within the group of individual student traits due to its highly personal nature.

Readiness

Instead of using the term ability, Tomlinson (2003) presents the idea of readiness in her model of differentiation. Ability implies a fixed, innate state that allows for little intervention and improvement through instruction. In contrast, readiness “refers to a student’s knowledge, understanding, and skill related to a particular sequence of learning” (p. 3). A student’s readiness is affected not only by his or her general cognitive proficiency, but also by a wide range of external factors, including prior learning and life experiences. Given these variables, it is clear that readiness describes a state for each student that can change over time, topic, and circumstance, Teachers therefore need to constantly assess their students to maintain appropriate learning conditions for their

students to thrive academically. Failure to consider readiness means missing the moderate challenge benchmark and can have disastrous consequences. In the reading classroom, assigning every student the same text without consideration is a prime example. Of a "One-book-for-all can decelerate the achievement of students… Instead of progressing, they slowly and steadily slide backwards" (Allington, 2002; Robb, 2008; Tomlinson, 1999; as cited in Robb, 2013, p. 15).

Interest

Tomlinson (2003) declares that a student's interests "refers to those topics or pursuits that evoke curiosity and passion in a learner" (p. 3). A subject that engages a student's interest will resonant and drive the student to learn and understand, as "Studies confirm that providing elementary students with opportunities to make choices in reading activities increases their motivation to participate" (McLoyd, 1979; Reynolds & Symons, 2001; as cited in Sanden, 2012, p. 225). However, school is not intended to only acknowledge existing interests among students. Because teachers must tailor instruction to a wide variety of students, they are in the ideal position to expose their students to new ideas and develop hidden interests buried deep within each. Highly effective teachers are able to use differentiation through student interests to maximize engagement.

Learning Profile

Like the numerous variables affecting readiness, a student's preferences for learning are shaped by a variety of factors including learning style, intelligence, preference, culture, and gender. The blend of factors unique to each student is what Tomlinson (2003) calls a student's learning profile. Simply put, the learning profile "refers to how students learn best" (p. 3). Considering all we know about intelligence,

desire, challenge, readiness, and interest; it should be clear that by supporting a variety of learning profiles, schools and teachers are more likely to effectively and efficiently engage a larger number of students and produce better results. Snow and Biancarosa's (2004) description of their classes would be familiar to any teacher: "The students…have a wide range of expertise with reading, writing, problem solving, and speaking." Similarly, their conclusion reinforces what we feel intuitively, in that students "…require differentiated instruction that takes them where they are and moves them forward" (as cited in Robb, 2013, p. 15).

Affect

The affect trait describes "how students feel about themselves, their work, and the classroom as a whole" (Tomlinson, 2003, p. 4). Factors that influence affect can be related to features of the instruction, events on the playground, or even something entirely unrelated to school. The importance of affect is easy to underestimate, as recent brain research has shown that emotions can completely overpower the capacity to learn. For example, the brain of a student experiencing fear or insecurity "blocks off the pathways to learning and attends to the more basic human needs instead" (Given, 2002; Sousa, 2001, Wolfe, 2001; as cited in Tomlinson, 2003, p. 15). Positive student affect helps to reinforce the learning environment and can lead to fuller engagement and greater student success—and thus, increased positive affect. This emotion-driven aspect of student learning is as important to differentiation as is student cognition. "Compelling all students to read the same text frustrates…struggling students and lowers their self-confidence and self-efficacy" (Guthrie, Wigfield, Metsala, & Cox, 1999; Guthrie, Wigfield, & Klauda, 2012; as cited in Robb, 2013, p. 13).

If a teacher considers a single student's unique combination of these four traits, it is possible to create an extremely personal map of that particular child. To effectively reach every student, a teacher must take these traits into consideration when creating a meaningful curriculum. This presents a problem, however, as taking differentiation its logical conclusion means creating an Individualized Education Program (IEP) for each student. Given practical limitations on a teacher's time and capacity, this is where the role of teacher as decision-maker is crucial. The teacher will choose the areas most appropriate for differentiation and outline an adaptable framework while relying on student-led learning to manage the finer points of individualization.

Differentiation in Practice

Many teachers recognize the importance in responding to the diverse needs of students in their classrooms, but often wonder how to differentiate. As described by Tobin and McInnes (2008), a differentiated approach "proactively sets out to assess, accommodate, and celebrate difference in creative ways for the benefit of all learners. Such responsive teaching bodes well for literacy learners across the ability and diversity spectrum" (p. 9).

While teachers have little-to-no control over the individual traits each student brings to the classroom, there are ways to adjust the classroom environment itself. Tomlinson (2003) has identified four of these classroom elements as areas in which a teacher can differentiate while taking into consideration the needs of the students: content, process, product, and learning environment (p. 4). It is important to note that the teacher's decisions are a crucial part of the differentiation process, as general curriculum guidelines cannot possibly address individual student needs:

> Effective differentiation is not found in a basal series or even in a particular research-based instructional strategy. Rather, it is found in the decisions teachers make based on their understanding of the reading process, in-depth knowledge of their students, consideration of an array of effective instructional practices supported by research, and ability to select models, materials, and methods to suit particular students as they engage in particular literacy acts. (Watts-Taffe et al., 2013, p. 306)

A teacher need not differentiate on all of these areas at once and may choose to address only one at a time.

Content

Quite simply, content refers to what a student needs to learn or how the student will access the information. Content consists of the core topics, concepts, or themes presented to the student and is usually regulated outside the classroom—state and national standards often guide curriculum decisions made at the school or district level (Heacox, 2002). Teachers can differentiate the content by applying what they know about their students to their instruction; the four student traits discussed above help guide teachers to appropriate materials. A typical reading example would be compiling lists of books at different reading levels and matching each student to the appropriate level (Tomlinson, 2000).

Process

The differentiating process requires both the teacher and student understanding of how the student learns best. This includes how the student will learn the content: classroom activities, assignments, and other work in which the student makes sense of or

comes to understand the content (Tomlinson, 2003). Teachers can differentiate process in countless ways, from adjusting complexity and abstractness (Heacox, 2002) to varying the time allotted to a task and the level of support offered to students (Tomlinson, 2000). Tools such as MI theory can inform process decisions, influencing the way content is presented, while classroom organization techniques such as grouping alter how students interact with the information. Encouraging students choose from a variety of books within a single theme—biographies, for instance—can drive better understanding by appealing to individual's topical interests.

Product

The product refers to how students will show what they know or have learned (Tomlinson, 2003). In my experience, students have created many meaningful types of products to showcase their learning. The products have ranged from timelines, comics, sculptures, and museum exhibits to debates, talk shows, plays, songs, puppet shows, newspaper articles, poems, and diary entries. Heacox (2002) offers additional product options: radio program, slideshow presentation, book jacket, animated film, advertisement, and investigative report. Students can use critical thinking skills to represent their ideas through music, writing, artistic creations, and speeches. Embracing the idea of MI theory in student output opens the door to high levels of creativity, but this sort of flexibility in product means that "that teachers will create different levels of expectations for task completion within a lesson or unit" (Waldron & McLeskey, 2001, p. 176; as cited in Lawrence-Brown, 2004, p. 37). Teachers will need to decide when differentiating product is most appropriate and necessary. Done in an intentional and thoughtful way, differentiation can have profound results. For example, Robb (2013)

observed an eighth grade girl from the Ukraine who disliked writing to the point of refusing to do so. When this student was allowed to draw instead, her resulting illustrations demonstrated understanding of what she had read.

Learning Environment

The last differentiated classroom element is the learning environment, which is defined as the operation and climate of the classroom itself and includes everything from basic classroom rules and procedures to the arrangement of furniture (Tomlinson, 2003). Students are keenly aware of what's going on around them; small changes in the day-to-day "mood" can have a clear impact on performance. Differentiating the learning environment could involve creating study areas, setting aside quiet time, displaying multicultural learning materials, or even altering when and how work is turned in and returned (Tomlinson, 2000). It is important for the teacher to make the classroom a safe and welcoming place for all students.

Within a differentiated classroom environment, student choice remains a major component. In fact, Tobin and McInnes (2008) imply that it's the most important component of all, saying, "At the heart of differentiating instruction in language arts is the need to provide learners with choices about what they read and to design their work products so that they are a better match for learners" (p. 3). They are not alone, as Knowles (2009) agrees, if not quite as emphatically, "With differentiated instruction in reading, one of the most important facts is student choice in selecting literature" (p. 27). This focus on choice has a measurable impact on student performance. Based on the results of their study, Tobin and McInnes (2008) learned, "differentiated instruction helps students understand and apply content and processes in their literacy learning and to have

choices about their different learning experiences" (p. 8). Choice can motivate students and increase their interest in reading.

There is no designated formula that teachers can use to implement differentiation because all students within each classroom of learners come to school bearing an array of interests, talents, readiness and background knowledge. In addition, teachers are just as varied in their preferences as the students they teach. Since there is not just one recipe for how to differentiate, I will share some practices researchers have found to be effective and relevant to differentiated reading instruction.

Assessment

In a differentiated classroom, "there is a strong link between assessment and instruction" (Cox, 2008, p. 54). Assessing students carefully and regularly using a variety of assessment tools, then analyzing the resulting data can help determine patterns of need to group students accordingly (Watts-Taffe et al., 2013). "Differentiated instruction in reading requires that teachers assess students' current levels so reading achievement can match reading content and instruction to the needs of students to enable all students to make continuous progress" (Firmender, Ries, & Sweeny, 2013, p. 11). Assessing students' independent performance can guide reading instruction (Sanden, 2012). When teachers assess where students are, they can start from that point by providing information and connecting with the child's learning style and interests (Knowles, 2009). Assessments can provide the necessary information to guide differentiated instruction.

Formative Assessments

Formative assessments are considered assessments for learning because they give teachers information about where students are at any given point in the learning. In using

formative assessments, teachers can start at the students' current levels "rather than adopting a standardized approach to teaching that seems to presume that all learners of a given age or grade are essentially alike" (Cox, 2008, p. 53). Teachers can use formative assessments to inform teaching decisions to help move students forward in their learning (Afflerbach, 2011; Tomlinson, 2009; as cited in Robb, 2013). In a sense, formative assessments help answer a teacher's question, What am I going to learn from and about my students today? (Robb, 2013).

Common formative assessment practices within differentiated classrooms include: writing anecdotal notes; tracking reading in logs or graphs, writing responses and summaries, marking comprehension strategies with sticky notes, recording story elements, reviewing unfamiliar vocabulary, participating in oral conversations to monitor students' reading (Sanden, 2012); circulating among students responding to questions, helping them solve problems, offering suggestions, and helping them set goals for next steps (Allison, 2009; Serravallo, 2012; Robb, 2008; as cited in Robb, 2013, p. 17). This wide range of practices allows for flexibility in instruction and intervention, which is crucial for a teacher to adequately meet students' needs (Watts-Taffe et al., 2013). In using these types of formative assessments, teachers are able to give students frequent, qualitative feedback from which they can benefit greatly (Serravallo, 2010, 2012; as cited in Robb, 2013). Formative assessments can be used as tools to inform students about their progress in reading as well as guide teachers about instruction and planning. Formative assessments provide teachers with data for targeted teaching (Robb, 2013).

Summative Assessments

Summative assessments, synonymous to product, are an element of differentiation and are tools to show teachers what students have learned. These assessments are typically at the end of a unit to show what skills, strategies, and standards students have mastered. Recall the examples of products discussed earlier in this literature review. Keeping summative assessments "open-ended and creative can increase student engagement" (Ankrum & Bean, 2008, p. 140) because allowing students freedom and input into how they demonstrate knowledge will make for more meaningful exercises.

Grouping Formats

Based on analyzing assessment data, teachers can learn more about their students and make informed decisions about grouping students based on interest, readiness, and learning profile. Arranging the classroom for small group, large group, and individual learning provides opportunities for teachers to meet the needs of their students (Cox, 2008). In this approach, teachers can model what good readers think and do, allow for literary discourse, and individualize what students read and do.

Whole Group

During whole-group instruction for reading, teachers choose quality children's books to model what good readers think and do (Sanden, 2012). Ankrum and Bean (2008) describe how whole-group instruction works:

> Curriculum-based, grade-level appropriate skills, and strategies can be introduced to the whole class, ensuring that all children gain the needed exposure to this material. Teachers may choose to use approaches such as shared reading or interactive read alouds to provide explicit teaching through modeling for all the students in the class. (p. 139)

Reading aloud provides equal access points to learning vocabulary, content, and skills. Whole group instruction provides opportunities for discourse independent of reading readiness. Research suggests, "Early and continual exposure to lots of books and oral language makes it easier for children to learn to read" (Knowles, 2009, p. 27).

Harvey and Goudvis (2007) stress the importance in explicitly teaching reading comprehension strategies to students so they can in turn use the same strategies to construct meaning when reading independently. Through read alouds, teachers can model what good readers think and do: how to activate and connect background knowledge, ask questions, make inferences, visualize, determine importance, and summarize and synthesize—reading strategies necessary to understand the text (Harvey and Goudvis, 2007). As teachers read aloud, they can explain their thinking to their students as they uncover the meaning of a variety of texts.

Small Group

Flexible grouping is one strategy that may help address the wide range of skills and interests within a classroom (Firmender et al., 2013; Watts-Taffe et al., 2013; Knowles, 2009). Heacox explained that flexible grouping helps teachers respond to the needs of learners because they can use the evidence provided by assessments to create lessons containing specifically tailored activities (2002). Furthermore, Ankrum and Bean (2008) explain, "when children demonstrate a need to switch groups, teachers can do that, again based on the assessments" (p. 139). Within the specific discipline of reading, small, flexible groups allow teachers to match texts to readers (Watts-Taffe et al., 2013). Research supports this approach to using differentiated content, repeatedly showing that instructional grouping results in increased achievement for students, regardless of reading

level (Gentry & Owen, 1999; Kulik, 1992; Rogers, 1991; Tieso, 202; as cited in Firmender et al., 2013). Tomlinson et al. (2003) state this performance improvement quite plainly: "Students in small within-classroom learning groups achieved significantly more than students not learning in small groups" (p. 132).

Many teachers might wonder how to manage students when they are not meeting with a teacher in small group, heeding the cautionary words of Ankrum and Bean (2008): "It is imperative that teachers find methods to keep all children actively engaged in meaningful literacy learning, while meeting with small groups or individual learners" (p. 140). Literacy centers have proven effective means to do so, as they can be designed to match students' readiness, interests, and preferred modes of learning (Tobin & McInnes, 2008). Ankrum and Bean (2008) agree with this approach, stating, "With careful planning, the activities within the literacy centers can be tiered to provide differentiated practice of reading skills and strategies and/or reinforcement of skills taught in whole class or small groups" (p. 140). If literacy centers in combination with independent reading are established as classroom routines, they can serve as important instructional time for teachers to differentiate when teachers are engaged in small group instruction.

Independent Reading

I was most surprised and intrigued by the research on differentiating instruction through independent reading. It is an area where I lacked knowledge in how to use this time to meet the needs of all of my students. Robb (2013) indicates that independent reading is a significant accelerator of reading achievement, vocabulary development, and formation of prior knowledge. Independent reading serves as an opportunity to meet the needs of students (Sanden, 2012). Knowles (2009) adds, "Reading for pleasure is

significant in the development of good readers and good readers are good test takers and good writers, they have well-developed vocabulary, and they do well in the workplace. For this reason, it is imperative that we work diligently to make reading a pleasure for a lifetime" (p. 28).

For independent reading to be an effective tool to differentiate, teachers need to explicitly model what independent reading look likes, and guide students to find spots in the classroom to read where they can be successful (Sanden, 2012). Class time should be spent reading instead of just doing worksheets and drills (Knowles, 2009). In addition, teachers should provide tools for students to find "just right" books (Robb, 2013; Knowles, 2009). These tools include, but are not limited to, having students choose from a leveled classroom library in which books are grouped by difficulty; teaching students the "five finger test" so they can directly assess books themselves by counting difficult words on a randomly-selected page (Sanden, 2012); or accessing any number of online resources such as BookAdventure.com's Book Finder, Scholastic.com's Book Wizard®, or Lexile.com's Lexile® Measure system. Scaffolding student book choices while "ensuring students' reading interests remains paramount" (Sanden, 2012, p. 225) to differentiated reading instruction.

Conferencing with students should be a part of the independent reading process. During this time, teachers can "converse with students about their selection of texts, the strategies the children are using, and challenges in their process. Such conversations can offer great insight into a reader's strengths needs, and interests" (Ankrum & Bean, 2008, p. 139). Informal data gathered from such conferences could serve as formative assessments that teachers can revisit to make improvements to their instruction. For

example, if a student shows a misconception or misunderstanding of the learning objective, the teacher can quickly clarify, reteach, and reevaluate the student. On the other hand, if a student has already shown mastery of a learning objective, the teacher can extend and expand the student's learning.

Within the Schoolwide Enrichment Model-Reading (SEM-R) approach to differentiated reading instruction, there is a phase designated to support independent reading. Its charge is to "stimulate interest in and enjoyment of reading, leading to higher reading achievement, by enabling students to self-select and read high-interest books of personal choice that are slightly to moderately above current reading instructional levels independently with differentiated instruction provided in weekly teacher conferences" (Reis, McCoach, Little, Muller, & Kaniskan, 2011, p. 464). Reis et al. (2011) found that differentiated reading instruction most impacted student engagement and attitudes about reading. Teachers shared a positive shift in reading climate with the implementation of SEM-R and also showed satisfaction in their use of differentiated instruction in reading. They liked a flexible approach using their professional judgments to meet the needs of students. Differentiating reading instruction can improve student engagement and interest in reading.

Differentiation Summary

As we have seen, decades of experimentation and research into the application and effectiveness of differentiation have given us a wealth of information. Teachers in 2016 have a box full of tools, including general principles about differentiation, student traits and classroom elements to consider, and practices to adopt and apply to their own unique circumstances. Best of all, differentiation has been shown to work and advocates

for the practice have real evidence at the ready. As Firmender et al. (2013) state, "All students should have opportunities to participate in appropriate learning experiences, and differentiated instruction can be used to ensure that all learners experience continuous progress and increase their performance in reading" (p. 6). Like their students, all teachers are at different points in their ability to and demonstration of differentiation. Moreover, I believe that teachers need to determine their philosophy of teaching and learning, learn about their students, decide how to best meet their students' needs, use best practices, and simply try it out. Because teachers are all different, we need to find what works best in our own classroom environments. Watts-Taffe et al. (2013) find this to be true as well, stating, "Although there are many ways to differentiate instruction, the needs, interests, and strengths of students within specific instructional contexts guide decisions about how best to differentiate at a given point in time" (p. 313).

Even when I consider all the options for techniques and approaches and assessments and everything that goes into teaching, the most important thing I learned in all my investigation is this: "the recurring message from research is that it is the teacher, not the program or materials that makes the difference; therefore, only a well-prepared teacher can effectively differentiate reading instruction for students" (IRA, 2000; Taylor et al., 2002; as cited in Ankrum & Bean, 2008, p. 143). This goes back to my role as "Teacher as Decision-Maker." As their teacher, I am responsible for meeting the needs of my students and must consider the diversity of learners to best differentiate my reading instruction.

Gardner's Theory of Multiple Intelligences

As Gardner notes, his theory of Multiple Intelligence (MI) "respects the many differences among people, the multiple variations in the ways that they learn, the several modes by which they can be assessed, and the almost infinite number of ways in which they can leave a mark on the world" (Armstrong, 2009, p. x). Gardner's theory recognizes each human's individuality, and offers a strong rationale for teachers to differentiate their instruction.

According to Gardner (1993), "An intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal" (p. 15). In Gardner's theory, intelligence is not a measure of how smart a person is, rather it describes the different ways a person can be smart. Chapman (2009) views Multiple Intelligence theory as a way to define human nature from a cognitive perspective with a focus on questions such as how we perceive and how we are aware of things (as cited in Al Muhaidib, 2011, p. 34). The theory also gives insight into a person's learning capabilities and preferences, as the types of intelligence possessed by a student guide his or her interests, strengths, and weaknesses (Al Muhaidib, 2011). The most recent list of intelligences includes the following (Gardner, 2006):

Musical Intelligence. People who possess musical intelligence have a natural sense of pitch, melody, rhythm and tone. For example, *Beatrice created a jingle to persuade her class to buy the book she read.*

Bodily-Kinesthetic Intelligence. Students who have bodily-kinesthetic intelligence express themselves and their ideas through movement. For example, *Kahlil performed a skit to demonstrate the meaning of vocabulary words.*

Logical-Mathematical Intelligence. When people have logical-mathematical intelligence, they are skilled at carrying out complex mathematic operations. For example, *Joey constructed a timeline of the life of Steve Jobs.*

Linguistic Intelligence. Students who show linguistic intelligence think in words and use language to express themselves. For example, *Aeisha wrote a sequel to The Three Little Pigs.*

Spatial Intelligence. People who possess spatial intelligence think in three-dimensional ways and make mental pictures and images to learn. For example, *Daven mapped the setting of a story.*

Interpersonal Intelligence. Students who have interpersonal intelligence understand and interact effectively with others. For example, *Kim organized a debate between the two main characters in a story.*

Intrapersonal Intelligence. People who possess intrapersonal intelligence are thoughtful and reflective and have an ability to construct an accurate perception of themselves. For example, *Pramod wrote a diary entry as the author of a story after completing a book.*

Naturalist Intelligence. When people have naturalistic intelligence, they adapt to their surroundings and have a personal connection with the natural world. For example, *Helga collected artifacts representing main events from a story.*

Existential Intelligence. Gardner explained existential intelligence as a candidate intelligence. People who have existential intelligence ponder the most fundamental questions of existence. For example, *Metta explained the thinking behind the main character's motive to have a change of heart.* I have decided not to include this intelligence in my unit due to the difficulty in applying it within a fourth-grade setting.

Justifying Differentiation Using MI Theory

Given all we know about the reasons and ways to differentiate, using Multiple Intelligences theory as a tool to help one do so makes logical sense for teachers. Gardner (1993) himself said it best:

> An exclusive focus on linguistic and logical skills in formal schooling can shortchange individuals with skills in other intelligences. It is evident from inspection of adult roles, even in language-dominated Western society, that spatial, interpersonal, or bodily-kinesthetic skills often play key roles. Yet linguistic and logical skills form the core of most diagnostic tests of 'intelligence' and are placed on a pedagogical pedestal in our schools. (p. 31)

Despite Gardner's observations over twenty years ago, there still remains a disconnect in many classrooms between how children learn best and how they are being taught. In fact, the assertion that all intelligences should be held in equal regard conflicts directly with traditional educational approaches (Al Muhaidib, 2011). While reading lends itself naturally to a more linguistic focus, Multiple Intelligence theory can be applied within the discipline. Melton et al. (1999) affirm, "A reading program based on Multiple Intelligence theory encourages students to learn to read in ways that make reading skills most meaningful to them" (In Teaching and Learning section, para. 1). Differentiation, as

we know, can take many different forms so even something such as "teaching using different presentation styles will activate a wide assortment of intelligences and thereby facilitate a deeper understanding of the subject matter" (Brualdi, 1996; as cited in Al Muhaidib, 2011, p. 35). Beyond this deeper understanding, MI theory can also help teachers engage more children (Gardner, 1997). Al Muhaidib (2011) explains how: "Multiple Intelligence theory opens a pathway for teachers to develop a more inclusive, affective and effective instruction methodology to promote understanding and learning appreciation for the students" (p. 39). This appreciation for learning appeals directly to one of the core principles for effective differentiation: our brains hunger for meaning; keeping Multiple Intelligence theory in mind will feed that hunger, enabling students to make sense of their reading.

A reading curriculum that differentiates using the theory of Multiple Intelligences provides opportunities for students who may not otherwise be recognized in the classroom. Multiple Intelligence theory may also help teachers regard intellectual ability more broadly (Al Muhaidib, 2011). When Sword (2007) used Multiple Intelligence theory in her literature classroom, she started to take notice of students who did not originally come across as skilled readers or thinkers. She gave assignments that required the use of different intelligences, and as a result students expressed their knowledge of literature in creative and unexpected ways. For a poetry unit, she had students make visual representations of a poem. A student who did not take interest in poetry, rarely spoke in class, and whose written work was undistinguished produced a thought-provoking piece of art. Her collage represented the key concepts with imagery and clearly depicted her interpretation of the poem. Sword (2007) discovered students "pouring

energies and talents I had never even suspected into acts of nonverbal literary analysis, they emerge as sharper readers, clearer thinkers, and more dynamic and skillful writers. Paradoxically, their release from language freed them back into language" (p. 223). Her study demonstrates how students, when given a chance to be creative within different intelligences, can showcase their understanding of literature. Al Muhaidib (2011) agrees, "People will make greater progress in their learning when their strengths are acknowledged and taught to in the classroom setting" (p. 39).

A Multiple Intelligence theory approach to teaching reading can also help students who speak English as a second language (ESL). In culturally responsive classrooms, student learning is optimized because teachers, through inclusive instruction, establish high expectations and encourage complex thinking and knowledge while at the same time allowing students to maintain their cultural identity (Callins, 2006). Melton et al. (1999) wrote, "multiple input modes, using the various intelligences, will better assist struggling readers, particularly when the struggle is first, to understand the new language" (Connecting section, para. 3). By applying Multiple Intelligence theory, a teacher can help students make connections from past experiences to the text that a solely linguistic classroom in an unfamiliar language cannot. Because the Multiple Intelligence theory embraces diversity in learning, it stands to reason that it would also embrace the cultural and linguistic diversity in a modern American classroom. Adcock (2014) asserts that it does just that, proclaiming the theory "is valuable to teachers and students alike because it addresses the diversity of learners" (p. 54). More specifically, Al Muhaidib (2011) states with great conviction, that "Multiple Intelligence theory has redefined education and offered ESL teachers an opportunity to examine a more suitable approach

to teaching in view of student diversity" (p. 35). It is clear that a Multiple Intelligence theory approach to a reading curriculum can promote thinking and learning for a diverse range of students.

It is important to note that people do not possess just one intelligence. Rather, we exhibit each at different levels. Armstrong (2009) explained, "Most of us are highly developed in some intelligences, modestly developed in others and relatively underdeveloped in the rest" (p. 15). This diversity of distributions of intelligences is, in fact, necessary for a successfully functioning world, given the need for people with [all sorts of] different talents (Al Muhaidib, 2011). Gardner (1997) suggested we have the capacity to develop all intelligences given the appropriate encouragement, enrichment, and instruction. It is important, also, to be mindful of the potential for change in a child's intelligence profile as he or she progresses in his or her learning. Given this potential for change and each student's inherent differences, there can never be one single formula for reaching each individual child (Gardner, 1997). A curriculum that includes instruction tailored to the different intelligences will expect that every student participate in all facets and accommodate shifts in strengths and interests.

Quest

In my quest to learn how to blend Gardner's Theory of Multiple Intelligence and differentiated reading instruction, I found Gardner himself best reflects my approach to teaching: "there is [no] single royal road to an implementation of MI ideas in the classroom. I have been encouraged and edified by the wide variety of ways in which educators around the country have made use of my ideas" (Armstrong, 2009, p. x). In keeping with Gardner's thinking, I am tasked with creating a curriculum that combines

my philosophy of teaching and learning with best practices in differentiated reading instruction while considering Multiple Intelligence theory as entry points and means for assessment.

Chapter Summary

A differentiated reading curriculum using Gardner's Theory of Multiple Intelligences values the students who enter the classroom and fosters growth using their natural talents. Within Chapter Two, I analyzed the literature and research about differentiated instruction in reading, as well as connected these ideas to Gardner's Theory of Multiple Intelligences. In Chapter Three, I will explain the setting as well as the curriculum users and approach.

CHAPTER THREE

Methods

Introduction

As an elementary school teacher, I am responsible for providing experiences that allow my students to learn and grow at an appropriate level and in accordance with how they learn best. The purpose of this capstone is to create a reading curriculum that answers the question: *How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?* In this chapter, I describe the setting of my study, the potential users of my curriculum, and the approach I took to create my curriculum design.

Setting

I teach at a K-8 private school in a suburban Midwestern city. My school currently has about 420 students with 19 students enrolled in my fourth-grade class. The majority of my students are white and come from middle to upper-middle class families, but I also have students from other ethnic and economic backgrounds. Four of my students are pulled out of the classroom for reading enrichment services, which was determined based on their Cognitive Abilities Test and/or Iowa Test of Basic Skills scores. Two of my students have been diagnosed as having dyslexia and Attention-Deficit Hyperactivity Disorder (ADHD), and remain in my class for Reading. Between

these extreme cases, the remaining students cover a wide range of reading abilities. This is just one classroom of fourth graders in one school in one year, but it represents the variety of learners that exists in any classroom.

Curriculum Audience and Users

While the example classroom setting given above is specific, the intended audience for this curriculum is for fourth-grade teachers in general. The curriculum is designed with fourth-grade reading standards and students in mind, but the most important part is getting to know students individually. My curriculum offers teachers a range of activities that foster students' abilities and tap into students' interests. It provides useful options for teachers who find value in using MI theory to differentiate the reading curriculum. While I have not yet had an opportunity to implement this curriculum, I intend to do so next school year.

Curriculum Approach

My curriculum approach starts with an inventory to inform me on student learning. The learning profile (Appendix F) allows students to express their preferences in working alone, in partners, or in groups; their perceived academic strengths; how they learn best; along with their different ways of being smart. Students will complete their learning profile at the beginning of the school year so that I can address their preferences throughout the school year.

Understanding by Design (UbD) Framework

An Understanding by Design (UbD) framework serves as the outline to my unit. I have used several different approaches for unit planning over the course of my career, including a particular focus on Madeline Hunter's organization for lesson planning in my

undergraduate studies. However, her prescribed format is not suitable for a differentiated reading curriculum whereas UbD is, simply because its unbiased format allows me to use a variety of tools, such as MI theory, to teach and meet my students' needs. Its working backward design follows three steps: identify desired results, determine assessment evidence, and plan learning experiences and instruction (Wiggins, Wilbur, & McTighe, 2005). Expert in differentiated instruction Tomlinson affirms (2003), "it is the role of educators to 'uncover' what is essential to know, understand, and be able to do in the disciplines" (p. 60).

Prior to mapping out a curriculum, it is important to determine the end goal. Teachers should ask themselves what they want their students to know, understand, and be able to do by the end of a unit. When teachers begin with the end in mind, they know where they need to get to while allowing themselves flexibility in the route to get there. The second stage, determining assessment evidence, involves deciding how to assess the learning that occurred—it should align with the desired goals. There are six facets to assessment: explain, interpret, apply, perspective, empathy, and self-knowledge. Different subjects will make use of different combinations of facets. The final stage in a UbD framework consists of the fine-grained planning of lessons to help the students acquire the skills necessary to demonstrate knowledge and understanding.

UbD provides an excellent framework for building a reading curriculum using MI theory to meet Common Core State Standards (CCSS). The CCSS will serve as the guideline in forming the desired results. MI theory will be woven into the assessments for/of learning and together with inquiry, direct-instruction, and guided practice serve as the foundation for instruction. See UbD unit template (Wiggins et al., 2005) below:

<table>
<tr><th colspan="2">Stage 1 – Desired Results</th></tr>
<tr><td colspan="2">Established Goals):
What relevant goals (e.g. Content standard, Course or Program Objective, Learning Outcome, etc.) will this design address?</td></tr>
<tr><td>Understanding(s):
Students will understand that…
• What are the big "ideas"?
• What specific understandings about them are desired?
• What misunderstandings are predictable?</td><td>Essential Question(s):
• What provocative questions will foster inquiry, understanding, and transfer of learning?</td></tr>
<tr><td>Students will know…
• What key knowledge and skills will students acquire as a result of this unit?</td><td>Students will be able to…
• What should they eventually be able to do as a result of such knowledge and skill?</td></tr>
<tr><th colspan="2">Stage 2- Assessment Evidence</th></tr>
<tr><td>Performance Task(s):
• Through what authentic performance task(s) will students demonstrate the desire understandings?
• By what criteria will "performance of understanding" be judged?</td><td>Other Evidence:
• Through what other evidence (e.g. quizzes, test, academic prompts, observations, homework, journals, etc.) will students demonstrate achievement of the desired results?
• How will students reflect upon and self-assess their learning?</td></tr>
<tr><th colspan="2">Stage 3 – Learning Plan</th></tr>
<tr><td colspan="2">Learning Activities:
W = help the students know where the unit is going and what is expected; help the teacher know where the students are coming from (prior knowledge, interests)
H = hook all students and hold their interest
E = equip students, help them experience the key ideas, and explore the issues
R = provide opportunities to rethink and revise their understandings and work
E = allow students to evaluate their work and its implications
T = tailored (personalized) to the different needs, interests, abilities of learner
O = organized to maximize initial and sustained engagement as well as effective learning</td></tr>
</table>

Common Core State Standards (CCSS)

I plan to use English Language Arts Common Core State Standards (CCSS) as a guideline for curriculum goals because they were specifically developed to serve as

learning benchmarks for 21st century students in grades K-12 (VanTassel-Baska, 2015). The CCSS "attempts to standardize what needs to be learned by American students at given states of development in these core subject areas, the standards to not dictate how teachers or schools should go about ensuring that learning has occurred" (CCSSO, 2011; as cited in VanTassel-Baska, 2015, p. 191). That is, the standards are instructional benchmarks, not comprehensive curriculum or set of instructional practices. Using CCSS makes this curriculum transferrable and relevant to all fourth-grade teachers required to use state standards as a guideline for reading instruction.

Human Subject Approval

I received approval for my capstone project from the Human Subject Research Committee of the Hamline University School of Education on November 24, 2015 (Appendix L). No human subjects were involved in this study, as this was a curriculum project.

Chapter Summary

In Chapter Three, I provided information about the setting, audience, and curriculum approach. I also gave an overview of how I will combine English Language Arts Common Core State Standards and Gardner's Theory of Multiple Intelligences within an Understanding by Design framework. Chapter Four will include an explanation of the unit's desired goals, assessment evidence, and learning plan.

CHAPTER FOUR

Findings

Introduction

I spent much time pondering solutions to my question: *How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?* I combined what I learned in my literature review with my decade plus of experience teaching elementary school students to form a comprehensive unit plan that I will implement next school year.

Understanding by Design

I used an Understanding by Design framework to jumpstart the planning of the unit. Its "begin with the end in mind" organization enabled me to see where I wanted to go and then map out the road to the final destination.

Identify Desired Results

In the first stage, I set goals to align with English Language Arts Common Core State Standards. I wanted to plan a non-fiction reading unit so I focused on grade four informational text standards. Determining established goals was the easiest step because they were already written. Then I needed to choose a topic of study. I debated between creating a unit celebrating Black History Month or one that connected to a fourth-grade science unit on inventions. I chose the topic of inventions and inventors because I thought

it would lend itself to more possibilities for inquiry and opportunities to construct knowledge using MI theory. I found a book, *What Do You Do With An Idea?* by Kobi Yamada that had the ability to set the tone for a thoughtful unit. The book's title served as one essential question and I added "Why do people invent?" and "How do inventors solve problems?" as two more. These questions "foster inquiry, understanding, and transfer of learning" (Wiggins et al., 2005, Stage 1 section).

The big ideas of the unit center on the reality that inventors go through a trial-and-error process to solve problems and make and improve their inventions. They do not get the correct answer right away; rather, they have to work hard, problem solve, figure out what to do when Plans A, B, and C do not work. Inventors learn from their mistakes and persevere—character traits I want my students to learn and exhibit.

I referenced the unit's established goals to guide what students will be able to do as a result. I found a variety of resources from *Strategies That Work: Teaching Comprehension for Understanding and Engagement* by Harvey and Goudvis (2007) and *Inquiry Circles in Action* by Harvey and Daniels (2009) that matched the established goals. By the end of the unit, students will be able to ask and wonder about information; infer the meaning of unfamiliar words; use text and visual features to gain information; make distinctions between what they think is important and what the author most wants them to take away from the reading; determine main idea and details; read with a question in mind; draw inferences from images, features, and words; and use a variety of ways to synthesize information and share their learning.

As a result of the unit, students will know nonfiction text can inform them about people, events, and how things came to be; problem solving often involves making

mistakes and learning from those mistakes to improve the solution; inventors must often take responsible risks to make great breakthroughs; and inventor vocabulary terms. All of these facets combined form the desired results.

Assessment Evidence

In an Understanding by Design framework, assessment evidence is the second stage of planning. My unit's assessment evidence directly corresponds with the goals established in stage one. I used a combination of performance tasks, student self-reflections, anecdotal notes, and think sheets to assess what students should know, understand, and be able to do by the end of the unit.

Harvey and Goudvis (2007) write, "The only way we can confidently assess our students' comprehension is when they share their thinking with us" (p. 39). Within *Strategies That Work*, Harvey and Goudvis share many examples of how to explicitly instruct reading comprehension strategies using think sheets. Throughout my unit, I will show my thinking and model what good readers do during read alouds. With each read aloud and corresponding think sheet written in the form of an anchor chart, I will demonstrate the thoughts going on in my head as I read. Then I will listen to and record examples of my students' thinking. The anchor charts will serve as a place to hold thinking in a visible, public manner to be used as guides when students craft their own responses. After teaching and modeling what good readers think and do, students will practice their thinking during independent reading using the same think sheets taught during read alouds. At the bottom of each think sheet I provide a place for self-reflection, as it is helpful to see how students assess their understandings as readers. According to Harvey and Goudvis (2007), student "responses give them a chance to weigh in with

reactions, opinions, and personal connections, and through their responses we are able to assess their understanding, learn more about them as readers, and respond with appropriate instruction" (p. 7). Think sheets will provide me with the information necessary to plan future instruction.

In Summer 2013, I took a Gifted Education class at Hamline entitled, *How to Challenge Talented Readers*. I thought it would give me everything I needed to know to answer my capstone question. While it did not resolve my unanswered question, the class did spark inquiry into my own reading instruction and provided me with a few resources I could use immediately in the classroom. Know vs. No? (Appendix D) was one of those resources. I decided to use Know vs. No? as a pre-assessment of students' understanding of the unit's vocabulary. I can use what I learn to guide and extend their understanding of the inventor vocabulary terms with think sheets, visual vocabulary, and independent reading conferences. I will then revisit Know vs. No? at the end of the unit to show what growth students have made as a result.

My unit includes an assessment tool not present in my current classroom setting: reading conferences. I did not realize the importance of reading conferences until my review of literature where I learned how invaluable they are to understanding students' thinking. In the words of Harvey and Goudvis (2007), "The reading conference provides an ideal opportunity to talk one on one with students and help them sort out their thinking and come to a deeper understanding of how reading strategies support comprehension" (p. 40). I had no prior experience conducting reading conferences so I started by looking for images of reading conference templates. None of the templates seemed to satisfy the purpose of my reading conferences for this unit so I constructed my own (Appendix J).

During reading conferences, I will check in with students on their inventor biographies, note/answer their questions, and prompt them to become more thoughtful readers through questioning. I set a realistic expectation of meeting with students twice throughout the course of the unit so I included space to document both conferences. Reis et al. (2011) found Schoolwide Enrichment Model – Reading (SEM-R) to be an effective practice to differentiate reading, so when I happened upon SEM-R bookmarks (Project SEM-R, University of Connecticut, 2016) related to biographies, I knew I could use them in some capacity. The bookmarks contain questions that will spark thinking and prompt thoughtful discourse. I included some of the biography questions from the bookmarks on the bottom of the reading conference form (Appendix J). Harvey and Goudvis (2007) note, "When we listen to kids, ask them questions, and watch them closely, we learn not only what they understand, but also what they don't understand. We can begin to see how we can design instruction that is responsive to what they need to learn" (p. 39). Connecting with students during reading conferences will provide me with additional information into their thinking.

Students will use a table (Appendix G) to document their participation in Problem Solving Centers as they discover why people invent, how inventors solve problems, and what you do with an idea. Gardner's multiple intelligences, represented with visuals, denote the rows while each of the four weeks form the columns. Throughout the unit, students will record the date and specific activity chosen within each intelligence. They can reference the table when they complete their end-of-unit reflection (Appendix G). Their reflection upon the unit's essential questions should show what knowledge they have constructed through their active participation in Problem Solving Centers.

During the first and last weeks of Problem Solving Centers, I will record observations using anecdotal notes (Appendix H). As students flow to different centers thinking and acting like inventors, I will document what I see and hear. My anecdotal notes will serve as authentic assessments for and of student learning.

I knew I wanted to culminate the unit with a R.A.F.T. (Role, Audience, Format, Topic) project because it naturally differentiates the product in ways that can activate different intelligences. I have used R.A.F.T. projects throughout my teaching career and they provide opportunities to show creativity and depth of understanding and knowledge that more prescriptive projects do not. Role is who/what role the student takes on, Audience refers to who students should consider as the audience for the product, Format means the form the product takes to show the students' understanding of established goals, and Topic refers to the important topic of the product.

I created R.A.F.T. project options (Appendix I) with specific attention to engaging the different intelligences. The table of project options includes the same visuals that correspond to the multiple intelligences present in each Problem Solving Center. The images serve as cues to the intelligences that are most activated by the R.A.F.T. options. To evaluate student work, I made a R.A.F.T. project rubric (Appendix I) using a template I have used in the past. The rubric specifies on what criteria the "performance of understanding" (Wiggins, et al., 2005) will be judged.

Throughout the unit, I will collect information about student learning from various assessment tools. The assessments reflect thoughtful attention to best practices in reading and thinking related specifically to the desired results.

Learning Plan

I outlined my learning plan in table format as part of the unit plan (Appendix A) to easily access lesson objectives, overview, assessment, and intelligences activated. Desired results and assessment evidence are embedded throughout my learning plan. I considered best practices in reading, differentiation, and Multiple Intelligence theory as well as my experience as "Teacher as Decision-Maker" to construct my lesson plans. Refer to the detailed unit plan as we discuss below what happens in each of the four weeks of this unit.

Week One

I will launch the unit with *What Do You Do With An Idea?* by Kobi Yamada, a story whose title became one of the unit's essential questions. The story will set the tone for a mindful unit that promotes asking, wondering, thinking, and acting. In this first week, I will spend a great deal of time reading aloud books about inventors and modeling what good readers think and do using think sheets (Appendix E). I chose *The Right Word: Roget and His Thesaurus* by Jen Bryant because it relates closely to *What Do You Do With An Idea?* in that Roget had an idea, continually built upon his idea, and eventually turned that idea into the thesaurus that changed the world. I selected two biographies about Margaret E. Knight because they show women's roles in the thinking and invention process and contain historical references to their struggle in being taken as credible inventors. *Marvelous Mattie: How Margaret E. Knight Became an Inventor* by Emily Arnold McCully and *In The Bag! Margaret Knight Wraps It Up* by Monica Kulling will expose students to two separate texts that allow them to integrate information from both to write knowledgeably about her life.

Gardner's Theory of Multiple Intelligences will play a major role in my unit from the very start. I will tap into the various intelligences with lesson hooks, activities, books, and products. In week one, I will introduce Problem Solving Centers by referencing a learning profile (Appendix F) students will have completed the first weeks of school. The learning profile shows student strengths, preferences, and different ways of being smart. Each Problem Solving Center (Appendix G) corresponds to each of Gardner's intelligences (2006): musical, bodily-kinesthetic, linguistic, logical-mathematical, spatial, naturalist, interpersonal, and intrapersonal. While students engage in center activities, they will construct knowledge directly related to the essential questions. They will use a table to document their participation in Problem Solving Centers (Appendix G). In the first week, I will monitor and make anecdotal notes (Appendix H) about students as they rotate to different centers. This observation time will also provide opportunity to reinforce respectful, pre-established Problem Solving Center routines in line with classroom expectations.

I will introduce the independent reading project in week one as well. Each student will choose and read an inventor biography based on his/her own interests and readiness. I will provide a list of book titles, including each book's Lexile (Appendix C) for students to reference, although they will not be limited to selecting a book from the list. Finally, students will complete Know vs. No? (Appendix D) the first week as a way for me to pre-asses their knowledge of the inventor vocabulary terms. This step will give me information to guide instruction and serve as a benchmark of growth when revisited the last week of the unit.

Week Two

By the second week, students will have chosen an inventor biography that interests them at an appropriate reading level. This is when I will explain in more detail the independent reading project. Students will read their inventor biography over the next two weeks—thinking, questioning, and responding as they read. They will map out (Appendix J) how many pages and chapters they need to complete each week in order to accomplish the goal. About two hours of class time in the two-week period will be devoted to reading independently. Students will receive R.A.F.T. project options and the rubric (Appendix I) so they know the choices and how they will be assessed at the end of the unit. The intelligences visuals remain consistent on the R.A.F.T. project options as students search for an option that best suits their strengths or stretches them intellectually.

On two occasions in the second week of the unit, students will have time to read independently. During independent reading time, I will conference with students (Appendix J) to check in on their reading and thinking, learn more about the questions they have, and prompt deeper thinking as they read.

I will model and share my thinking of reading (Appendix E) with *The Real McCoy: The Life of an African-American Inventor* by Wendy Towle. Many children's books give attention to white male inventors because historically, this group was most able to receive patents for their ideas and inventions due to exclusionary practices that did not allow people of color equal access to invent. I purchased some additional books containing short biographies of African-American inventors: *What Color Is My World?: The Lost History of African-American Inventors* by Kareem Abdul-Jabbar, *African American Women Scientists and Inventors* by Otha Richard Sullivan, and *Black Pioneers of Science and Invention* by Louis Haber to supplement my classroom collection of

inventor biographies. *The Real McCoy* shares the reality of being an African-American living in Canada and the Unities States in the mid-to-late 1800s. I will open the day's lesson with an African-American spiritual, *Swing Low Sweet Chariot*, sung by slaves escaping slavery via the Underground Railroad. The song and lyrics will tap into students' musical intelligence and give context for how and why Elijah McCoy's parents fled to Canada before he was born.

When students participate in Problem Solving Centers in week two, I will convene reading in small groups based on readiness. I found an article *For these students, if you can picture it, you can solve the problem* on Newsela.com (2015) written at varying Lexiles and related to the unit's essential questions. I will use the article to teach the skill of finding main idea and details to all groups, but at readiness levels that match each student's profile of learning.

I will conclude week two with readers theater (Appendix K). I collected a few scripts about inventors—George Washington Carver, Margaret E. Knight, George Ferris, Garret Morgan, and Louis Pasteur—and will leave it up to the teacher or groups of students within a class to choose the specific script(s) used. Students will choose their roles, highlight their lines, practice independently, and rehearse in small groups before performing in front of the class. In the past, I have typically given more time to rehearse lines at home, but due to the informal, in-class presentation approach for this unit, one class time will be allotted for both practice and performance. In readers theater, "the children support each other by actively participating and sharing the work" (Tompkins, 2001, p. 25), an activity in line with students who possess interpersonal intelligence.

After students perform, they will reflect on the unit's essential questions (Appendix K) tied to the lives of the inventors from the readers theater scripts.

Week Three

In the third week, I will continue to model and share my thinking as I read *Snowflake Bentley* by Jacqueline Briggs Martin. I chose *Snowflake Bentley* to engage students who have naturalist intelligence. I will also show them a book of snowflakes Wilson Bentley was able to photograph with the invention he made. As I read, I will demonstrate and communicate how to read with a question in mind (Appendix E). Uncovering why Wilson Bentley invented will link back to one of the unit's essential questions.

During Problem Solving Centers, I will meet with small groups of students, but this time based on interest. Students will complete a short survey (Appendix B, Lesson 10) expressing their interest in inventions from different cultures. I will use the survey information to determine the book students will read and reference in small group: *A Native American Thought of It* by Rocky Landon with David MacDonald, *The Inuit Thought of It* by Alootook Ipellie with David MacDonald, *Africans Thought of It* by Bathseba Opini and Richard B. Lee, *The Chinese Thought of It* by Ting-xing Ye, and *The Arab World Thought of It* by Saima S. Hussain. Each of the above books contains visual and text features that will help students gain information. Together, each group will construct a think sheet (Appendix E) to gain information using text and visual features.

Week three will be the final week for students to finish reading their inventor biographies in class. While students read independently, I will conference with students

(Appendix J). They can use the think sheets (Appendix E) to track their thinking as they read.

Week Four

The last week will wrap up the unit and tie everything together. I will start the week reading *The Most Magnificent Thing* by Ashley Spires, a book that takes the reader through the long and sometimes frustrating process involved with inventing and creating. It is meant to send students off with a persevering mentality as they get to work on their R.A.F.T. projects (Appendix I). About two and a half days will be dedicated to R.A.F.T. project work time.

On the last day of Problem Solving Centers, I will take anecdotal notes (Appendix H) as students explore and engage in activities related to the different intelligences. Once students have completed their Problem Solving Centers – Student Table (Appendix G), they will reflect on their experiences using symbols to indicate their favorite center, which center made them think like an inventor, and the most challenging center. They will also complete a written reflection (Appendix G) using specific examples from the Problem Solving Centers to answer the essential questions. I will conclude Problem Solving Centers with *The Dot* by Peter H. Reynolds, inspiring my students to reflect on how they will make their marks on the world.

To culminate the entire unit, students will share their R.A.F.T. projects (Appendix I). I will use a rubric to assess their learning of the desired results (Appendix I). After R.A.F.T. presentations, we will gather together and revisit how we started the unit: *What do you do with an idea?* We will spend time thinking about the learning that happened as a result of Problem Solving Centers, read alouds, inventor biographies, self-portraits,

readers theater, small group work, and R.A.F.T. projects. They will answer the question on a sticky note and add their ideas to the pre-existing web created on the first day of the unit. We will discuss. While looking at the self-portraits made on day 1 of the unit, I will leave students pondering, "What will you do with the ideas inside your head?"

Chapter Summary

For Chapter Four, I created and explained a thought-filled, comprehensive unit plan to answer my capstone question: *How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?* Using an Understanding by Design framework, I determined desired results and assessment evidence before mapping out daily lessons. I considered best practices in reading differentiation and MI theory when designing my curriculum. In Chapter Five, I reflect on the results of Chapter Four and what I learned in the process of answering my capstone question.

CHAPTER FIVE

Conclusion

Reflections

When I started my capstone in Fall 2011, I had no idea I would just be finishing it in Spring 2016. In the intervening five years, I attended many workshops on differentiated instruction and took a variety of classes at Hamline on gifted education, searching for answers to my question: *How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences?* While I took away many learnings from the classes, I still did not have an answer to my question.

Over the last few months, I reflected on what I learned in my experiences as teacher and student and what I learned from the myriad of resources I read and analyzed. I knew I needed to develop a curriculum that made students think—about themselves as learners, thinkers, readers, and problem solvers. I could no longer keep the ideas brewing in my head; I needed to take action! That is when and how I devised a reading curriculum that differentiates using Gardner's Theory of Multiple Intelligences.

I have always believed that my students enter the classroom with a unique set of traits and gifts that make teaching each year full of new experiences. It is my job to tap into their strengths, help them grow in areas that are more difficult, and guide them as

they construct knowledge. My unit considers and engages the different ways of being smart.

Review of Literature

The learning activities included in my unit plan link directly to the research I found on effective practices in differentiated instruction. Tomlinson (2003) explained the importance in respecting student readiness, interest, and learning profile; meanwhile Tobin and McInnes (2008) reported on the value of choice when differentiating curriculum—all of which are embedded in my unit plan. From the very start of the unit, students will reference the learning profile they complete the first weeks of school as a way to recall their different learning preferences. In small groups, students will read articles based on their Lexile one week and then nonfiction books based on interest the following week. For the independent reading portion of the unit, students will choose biographies about inventors that interest them at their individually-appropriate reading levels. During problem solving centers, students will choose activities within each center based on what they find interesting. The unit's summative assessment reflects attention to the different ways students learn through the options provided, as well as the need for choice in students' ability to select their final product option. The above activities are just a few examples of honoring the student traits of readiness, interest, and learning profile and the principle of providing choice.

I was able to successfully use Gardner's Theory of Multiple Intelligences throughout my unit plan in the differentiation of content, process, product, and learning environment (Tomlinson, 2003; Heacox, 2002). Many of the choices offered to students are directly derived from his theory, enabling students to maximize their learning of a

particular target through their strongest intelligences. However, I also made a point to focus on a few particular intelligences in various lesson activities so as to promote students' development in areas that are not necessarily their strongest. Every student possesses intelligences at different levels (Armstrong, 2009), so I intentionally devised ways to unlock learning from multiple angles. MI theory also influenced my approach to differentiating assessment (Cox, 2008; Watts-Taffe et al., 2013; Sanden, 2012; Knowles, 2009) and classroom grouping (Cox, 2008) by driving the choices given students in the examples listed in the previous paragraph.

Limitations

Although I have poured over resources and put many thoughts and ideas into action, there are always aspects to consider and improve. In its current state, my unit plan implicitly connects language arts to different content areas such as science and social studies; however, the plan could expand into an interdisciplinary unit with the addition of specific science, math, and social studies standards embedded within the unit. Similarly, while my unit plan includes non-fiction texts about inventors from a variety of cultural backgrounds, I could have made more connections to multicultural education. In that same vein, my unit plan could have included bilingual books to address ESL education. I also found a graphic novel series about inventors that I purchased, but never used in the curriculum. The graphic novels will be available for students to read, but I could have woven reading and thinking about graphic novels into the unit. I also learned about inquiry circles from Harvey and Daniels (2009), which could enhance the plan as well. I could start with mini-inquiries in which students ask questions and through research find some answers to satisfy their curiosity. Overall, my unit respects the variety of learners

who enter my classroom each year, promotes thinking and reading, and supports how I think people learn and grow.

In the Future

Constructing a unit with the end in mind was extremely rewarding. I saw my ideas unfold as I planned each lesson around the desired results and assessment evidence. I imagine creating rich, meaningful interdisciplinary units for years to come by beginning with the end in mind.

I can share my research and unit plan with my team of fourth-grade teachers at our weekly Professional Learning Community (PLC) meetings. These team meetings are set aside to plan, pace, and discuss curriculum—a natural forum to communicate my findings. At my school, there is also a differentiating committee who collects differentiated instruction articles and teacher samples, and then organizes these resources into online folders that my colleagues can access anywhere they have internet access. I can share my approach with the committee and add the unit plan to the online resources for teachers who want to learn ways to differentiate a reading curriculum using MI theory.

While I strongly believe in the approach to reading instruction presented in this capstone and feel it matches my teaching style and philosophy, future research could broaden the approach and apply it to a statistically significant number of students to determine the quantitative benefits, if any. Given my small class size—and even the relatively small total number of fourth graders at my school—the only possible measurements I can do at this point in time and within my setting are qualitative. For example, the differentiation study done by Reis et al. included five schools across the

country, 70 classrooms spanning four grades, and lasted five months (2011). Despite lacking the scale necessary to truly measure my unit plan's effectiveness, I can work with my school, colleagues, and students to assess and refine the unit itself—in fact, it would be a disservice to the very ideas of differentiation and MI theory were I not to self-examine and adjust on a constant basis.

What do you do with an idea?

I found parallels between my capstone thinking, writing, and creating process and the book, *What Do You Do With An Idea*? by Kobi Yamada.

One day, I had an idea.

"Where did it come from? Why is it here?"

> How can a fourth-grade reading curriculum be differentiated using Gardner's Theory of Multiple Intelligences? I have a strong desire to better match my philosophy of teaching and learning to meet the needs of my students, especially in reading instruction. I know Gardner's Theory of Multiple of Intelligences can open the doors for many students whose strengths may not lie in reading and math.

I wondered, "What do you do with an idea?"

> That too was my capstone quest.

At first, I didn't think much of it. It seemed kind of strange and fragile. I didn't know what to do with it. So I just walked away from it.

I acted like it didn't belong to me.

> I started writing my capstone in Fall 2011. It is now Spring 2016.

But it followed me.

I still wanted to find an answer to my question.

I worried what others would think. What would people say about my idea? I kept it to myself. I hid it away and didn't talk about it. I tried to act like everything was the same as it was before my idea showed up.

Over the last four years, many people asked how my Master's degree was coming along. I always explained that I needed to finish my capstone. I didn't want to discuss it because it was not where I wanted it to be. Fast-forward to Fall 2016: After unlocking the vault to my capstone, I still did not want to discuss it because, again, it was not where I had hoped it would be. My literature review stumped me. I was perplexed how to combine, summarize, and synthesize all the articles, books, and learnings from the past five years.

But there was something magical about my idea. I had to admit, I felt better and happier when it was around.

After evaluating, rewriting and reorganizing my literature review, I was propelled.

It wanted food. It wanted to play. Actually, it wanted a lot of attention.

I wanted to dive into creating my unit plan after resubmitting chapters 1-3. I read, and pondered, and ordered a lot of books from Amazon. My parents watched our little boy multiple weekends so I could feed my question.

It grew bigger. And we became friends.

I liked the direction of my unit plan. I wanted to spend time creating lessons that tapped into different intelligences.

I showed it to other people even though I was afraid of what they would say. I was afraid that if people saw it, they would laugh at it. I was afraid they would think it was silly.

And many of them did. They said it was no good. They said it was too weird. They said it was a waste of time and that it would never become anything.

While I have not yet reached this phase, I do anticipate some skepticism. Different philosophies of teaching and learning may not find value in my unit's approach.

And, at first, I believed them. I actually thought about giving up on my idea. I almost listened to them.

I may doubt my approach after receiving feedback from others. I might listen to how they think the unit should be planned and abandon the ideas that give my unit life.

But then I realized, what do they really know? This is MY idea, I thought. No one knows it like I do. And it's okay if it's different, and weird, and maybe a little crazy.

I decided to protect it, to care for it. I fed it good food. I worked with it, I played with it. But most of all, I gave it my attention.

With "Teacher as Decision-Maker," I do think my plan is original and will not work for all teachers. I have given my idea all my attention these last few months.

My idea grew and grew. And so did my love for it.

After reflecting upon my process and product, I realize how much this unit supports my philosophy of teaching and learning.

I built it a new house, one with an open roof where it could look up at the stars—a place where it could be safe to dream.

My idea has been staring out the front window of my home, into the eyes of my students each day, and into the thoughts in my mind.

I liked being with my idea. It made me feel more alive, like I could do anything. It encouraged me to think big…and then, to think bigger.

It shared its secrets with me. It showed me how to walk on my hands. "Because," it said, "it is good to have the ability to see things differently."

Finding answers to my question forced me to dig deeper and think bigger.

I do see things differently now, having gone through the entire process.

I couldn't imagine my life without it.

I am so charged to do this unit with students. I cannot imagine doing a unit any other way.

Then, one day, something amazing happened. My idea changed right before my very eyes. It spread its wings, took flight, and burst into the sky.

It started with resubmitting chapters 1-3, forming a unit plan, and opening the unit with this story, then building lessons that provoked thinking and learning. It really took on a new shape.

I don't know how to describe it, but it went from being here to being everywhere. It wasn't just a part of me anymore… it was now a part of everything.

> While this may not happen for my project, I hope the result of doing the unit with my students will transform how they think about reading, themselves, and their ideas.

And then, I realized what you do with an idea…

You change the world.

> *Amo: volo ut sis.* "I am determined that you can be (anything you can be)." Devising a reading curriculum that differentiated using Gardner's Theory of Multiple Intelligences proved challenging. But the outcome I think is quite wonderful. In my charge to meet the varying needs of my students and to engage them in learning, I too learned. But still wonder, *What do you do with an idea?*

Amo: volo ut sis

In Spring 2008, the education department at the College of Saint Benedict asked former students to submit names of professors with whom they wanted to connect at our five-year reunion. I immediately thought of Professor Spring. A few days later, I learned he had passed away just a few months prior. I remember being flooded with emotion as I stood in an Apple Store in Palo Alto on vacation reading this unexpected e-mail. Soon after, I mailed a note to Professor Spring's wife explaining his effect on my teaching and learning—and my desire to teach in a similar way that respects, engages, and supports all learners. I shared my intrigue and delight with his break of day and blackbird assignments. She in turn wrote a thank you note and included the program from his funeral at which *Morning Has Broken* was sung. It was his favorite song. It will forever be a special song for me.

Amo: volo ut sis. “I am determined that you can be (anything you can be).”

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APPENDIX A

Unit Plan

Unit Plan: *What do you do with an idea?*

Stage 1 – Desired Results	
Established Goals: *What relevant goals (e.g. Content Standard, Course or Program Objective, Learning Outcome, etc.) will this design address?* CCSS 4.2.1.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. CCSS 4.2.2.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text. CCSS 4.2.3.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. CCSS 4.2.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area. CCSS 4.2.5.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text. CCSS 4.2.6.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided. CCSS 4.2.7.7 Interpret information visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. CCSS 4.2.8.8 Explain how an author uses reasons and evidence to support particular points in a text. CCSS 4.2.9.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. CCSS 4.2.10.10 By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band independently and proficiently, with scaffolding as needed a the high end of the range. a. Self-select texts for personal enjoyment, interest, and academic tasks.	
Understanding(s): *What are the big "ideas"?* • Inventors solve problems.	**Essential Question(s):** *What provocative questions will foster inquiry, understanding, and transfer of*

What specific understandings about them are desired? • Inventors go through a trial/error process to make and improve their inventions. *What misunderstandings are predictable?* • Inventors create without making mistakes.	*learning?* • Why do people invent? • How do inventors solve problems? • What do you do with an idea?
Students will know… *What key knowledge and skills will students acquire as a result of this unit?* • Nonfiction text including biographies can inform them about people, events, and how things came to be. • Problem solving often involves making mistakes and learning from those mistakes to improve the solution. • Inventors must often take responsible risks to make great breakthroughs. • Inventor vocabulary terms.	**Students will be able to…** *What should they eventually be able to do as a result of such knowledge and skill?* • Ask questions and wonder about information. • Determine the difference between what they think is most important and the writer's big ideas. • Use a variety of ways to synthesize information and share their learning. • Infer the meaning of unfamiliar words. • Draw inferences from images, features, and words. • Determine importance, ask questions, and respond to nonfiction text. • Determine the main idea and details of non-fiction text. • Read with a question in mind. • Use text and visual features to gain information.
Stage 2- Assessment Evidence	
Performance Task(s): *Through what authentic performance task(s) will students demonstrate the desired understandings?* • Problem Solving Centers • R.A.F.T. Project	**Other Evidence:** *Through what other evidence (e.g. quizzes, test, academic prompts, observations, homework, journals, etc.) will students demonstrate achievement of the desired results?*

By what criteria will "performance of understanding" be judged? • R.A.F.T Project Rubric	• Think Sheets • "Lady Edison" Response • Venn Diagram • Anecdotal Notes • Independent Reading Conferences *How will students reflect upon and self-assess their learning?* • Know vs. No? • Think Sheet Self-Reflections • Problem Solving Centers-Reflection

Stage 3 – Learning Plan

Learning Activities:
W = help the students know ***where*** the unit is going and what is expected; help the teacher know where the students are coming from (prior knowledge, interests)
H = ***hook*** all students and hold their interest
E = ***equip*** students, help them experience the key ideas, and explore the issues
R = provide opportunities to ***rethink*** and revise their understandings and work
E = allow students to ***evaluate*** their work and its implications
T = ***tailored*** (personalized) to the different needs, interests, abilities of learner
O = ***organized*** to maximize initial and sustained engagement as well as effective learning

Day	Objective(s)	Lesson Overview	Multiple Intelligences	Assessment
1	Ask questions and wonder about information.	Idea Web Invention Exploration *What Do You Do With An Idea?* Ask and Wonder Self-Portrait	Bodily-Kinesthetic Linguistic Spatial Interpersonal Intrapersonal	
2	Determine the difference between what they think is most important and the writer's big ideas.	Observe Roget's Thesaurus *The Right Word: Roget and His Thesaurus* Important to Me/Important to the Author Think Sheet Introduce Independent Reading Project Know vs. No?	Linguistic Interpersonal Intrapersonal	Self-Reflect: Important to Me/Important to the Author Think Sheet Know vs. No?
3	Use a variety of ways to synthesize information and share their learning.	Review Learning Profile Introduce Problem Solving Centers Problem Solving Centers	Musical Bodily-Kinesthetic Linguistic Logical-	Anecdotal Notes Problem Solving Centers – Student Table

			Mathematical Spatial Naturalist Interpersonal Intrapersonal	
4	Determine the meaning of general academic and domain-specific words or phrases in a text. Draw inferences from images, features, and words.	Flat Bottom Brown Bag vs. Flat Bag *Marvelous Mattie: How Margaret E. Knight Became an Inventor* Word/Inferred Meaning/Clues/ Sentence Think Sheet Invention Sketch Time	Linguistic Logical-Mathematical Spatial Intrapersonal	Word/Inferred Meaning/Clues/ Sentence Think Sheet
5	Draw inferences from images, features, and words. Refer to details and examples in a text when explaining what a text says explicitly and when drawing inferences from the text. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeable	Inference Charades *In The Bag! Margaret Knight Wraps It Up* BK + TC = I Think Sheet "Lady Edison" Web Quest	Bodily-Kinesthetic Linguistic Logical-Mathematical Naturalist Interpersonal Intrapersonal	Self-Reflect: "Lady Edison" Response Sheet
6	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	Introduce Independent Reading Project Review Nonfiction Bookmark Go over R.A.F.T. Project Options and Rubric Independent Reading	Linguistic Intrapersonal	Independent Reading Conferences
7	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	Swing Low, Sweet Chariot *The Real McCoy: The Life of an African-American Inventor* Facts/Questions/ Response Think Sheet Independent Reading	Musical Linguistic Intrapersonal	Self-Reflect: Facts/Questions /Response Think Sheet Independent Reading Conferences

8/9	Use a variety of ways to synthesize information and share their learning. Determine the main idea and details of nonfiction text.	Review Problem Solving Centers Problem Solving Centers Small Group: Main Idea and Details	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	Problem Solving Centers – Student Table Self-Reflect: Main Idea and Details Think Sheet
10	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	Readers Theater Readers Theater Response Sheet Interest Survey	Bodily-Kinesthetic Linguistic Interpersonal	Readers Theater Response Sheet
11	Determine the meaning of general academic and domain-specific words or phrase in a text relevant to a grade 4 topic or subject area. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	*Snowflake Bentley* Vocabulary Visuals Independent Reading	Linguistic Spatial Naturalist Intrapersonal	Vocabulary Visuals Independent Reading Conferences
12	Read with a question in mind. Determine the meaning of general academic and domain-specific words or phrase in a text relevant to a grade 4 topic or subject area. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. Compare and contrast a firsthand and secondhand account, of the same event or topic; describe the	*Snowflake Bentley* Read with a Question in Mind Film about Snowflake Bentley Venn Diagram	Linguistic Spatial Naturalist Interpersonal	Venn Diagram

	differences in focus and the information provided			
13/ 14	Use a variety of ways to synthesize information and share their learning. Use text and visual features to gain information. Interpret information visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.	Problem Solving Centers Small Group: Text Features	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	Problem Solving Centers – Student Table Self-Reflect: Text Features Think Sheet
15	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	Review Independent Reading Project Independent Reading Independent Reading Conferences	Linguistic Intrapersonal	Independent Reading Conferences
16/ 17	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	*The Most Magnificent Thing* Review R.A.F.T. Project Options and Rubric R.A.F.T. Project Work Time	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	
18	Use a variety of ways to synthesize information and share their learning.	*The Dot* Problem Solving Centers Problem Solving Centers – Reflection	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	Problem Solving Centers – Student Table and Reflection Anecdotal Notes

19	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information.	Review R.A.F.T. Project Options and Rubric R.A.F.T. Project Work Time	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	Revisit Know vs. No?
20	Determine importance, ask questions, and respond to nonfiction text. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band independently and proficiently, with scaffolding as needed a the high end of the range. a. Self-select texts for personal enjoyment, interest, and academic tasks.	Present R.A.F.T. Projects Conclude What do you do with an idea? Reference Idea Web and Self-Portraits from Day 1	Musical Bodily-Kinesthetic Linguistic Logical-Mathematical Spatial Naturalist Interpersonal Intrapersonal	R.A.F.T. Project Rubric

APPENDIX B

Individual Lessons

Day 1: *What Do You Do With An Idea?*

Grade Level: 4

Essential Questions:

- What are ideas?
- What do you do with an idea?
- Why are ideas important?

Materials:

- Book: *What Do You Do With An Idea?* by Kobi Yamada illustrated by Mae Besom
- What do you do with an idea? Web
- Sticky notes
- Inventions for Invention exploration
- Invention Exploration chart
- Paper for self-portrait
- Construction paper
- Glue

Objective:

- Ask questions and wonder about information.

Multiple Intelligences:

- Bodily-Kinesthetic
- Linguistic
- Spatial
- Interpersonal
- Intrapersonal

Procedure

Introduction

Whole Group – Idea Web

- Center of web: What do you do with an idea?
- Give each student a sticky note.
- Add their ideas to the web: What do you with an idea?

Small Group – Invention Exploration

- Each group will have a bag of the following inventions and will discuss/write down the problems they solve.
- Roles (established at the start of the school year): Review each role.
    - Gopher: retrieve bag of materials and take out one item at a time to discuss and record the problem it solves
    - Starter/Encourager: gets the group started, helps stay on track, encourages all group members to participate
    - Recorder: records group ideas
    - Reporter: reports information to the whole class
- Inventions to match Gardner's Theory of Multiple Intelligences
    - Linguistic – book marker
    - Logical-Mathematic – abacus
    - Bodily-Kinesthetic - ball
    - Spatial – map
    - Musical – music shaker or any instrument
    - Interpersonal – phone

- Intrapersonal – diary
- Naturalist – reusable bag

Object	Why was it made? What problem does it solve?
book mark	
abacus	
ball	
map	
instrument such as shaker	
phone	
diary	
reusable bag	

- Each group can report on one item and the problem it solves

Whole Group – Read aloud

<u>Introduce</u>

- Reference web from earlier in class – take a minute to read a few ideas

<u>Practice</u>

- Read aloud *What Do You Do With An Idea?* by Kobi Yamada illustrated by Mae Blossom
- Model: Thoughtful readers have a lot of questions and the most important ones are not the teacher's or the book's questions, but the reader's questions.
  - Questions can clarify confusion: What does fragile mean?
  - Questions can be answered from the text:

    How does the illustrator represent the idea?
    How is the idea different from the rest of the illustration?
    Why does the boy worry about what others would think?
    Why was the boy embarrassed about his idea?
    Why did it take the boy so long to share his idea?

    Model continuing to read and finding the answer. Mark sticky note with an A and move it to the spot where you found your answer. Answered later: "Many said it was no good. They said it was too weird. They said it was a waste of time and that it would never become anything."
  - Some questions do not get answered directly in the text:

    Why does the boy feel happier when his idea is around?
    How does the boy's attitude about his idea shift throughout the story?
    What does, "It is good to have the ability to see things differently," mean?
    Why do we have ideas?
    Can ideas follow us around?

From where do ideas come?
What does an idea need?
Do ideas add to our lives?
Can you imagine a world without ideas?
How can ideas change the world?

Close

- Have students share the questions they have throughout the story.

Think-Pair-Share

- What ideas are floating in around in your head?
- Did you and your partner have different ideas? Why is it important that we have different ideas?
- Did you and your partner have similar ideas? Why is it important that we have similar ideas?

Independent - Self-portrait with ideas

- Idea from:http://www.lincolncottage.org/wp-content/uploads/2015/10/idea-portrait_web.pdf
- Make self-portrait. See link with steps: http://everyonecandraw.net/Portraits%20mix%20and%20match%20sheets.html
- Students cut head, and glue onto a piece of colored construction paper
- Illustrate the ideas they have in their heads.
- Display student artwork.

Closure

- How will you give one of your ideas attention so it can grow?

Assessment

- Note how students answer, “What do you do with an idea?” on idea web.
- Observe/monitor group work.
- Note questions students asked during read aloud.
- Use self-portrait to learn about student ideas.

Day 2: *The Right Word: Roget and His Thesaurus*

Grade Level: 4

Essential Questions:

- Why did Roget invent?
- How did Roget solve a problem?
- What do you do with an idea?

Materials:

- Book: *The Right Word: Roget and His Thesaurus* by Jen Bryant and illustrated by Melissa Sweet
- Roget's 21st Century Thesaurus and original thesaurus
- Important to Me/Important to the Author Think Sheet and anchor chart
- Know vs. No?
- List of potential book options with Lexile provided

Objectives:

- Determine the difference between what they think is most important and the writer's big ideas.
- Explain how an author uses reasons and evidence to support particular points in a text. CCSS 4.2.8.8

Multiple Intelligences:

- Linguistic
- Interpersonal
- Intrapersonal

Procedure

Whole Group - Read aloud

Introduce

- Show *Roget's 21st Century Thesaurus* and his original thesaurus. Talk in small groups about any experiences you have had with using a thesaurus. Who do you think might need or use one?
- Compare and contrast a thesaurus with a dictionary. How are they alike and how are they different? When might you use one instead of the other? When might you use both?

Practice

- Look at Important to Me/Important to the Author anchor chart.
- Inform students that nothing matters more than their thinking when they read. As we read *The Right Word: Roget and His Thesaurus*, we will write down information on the left hand side that is important to us.
- However, nonfiction writers have something in mind they are trying to convey to readers and it is the reader's responsibility to pick up on that as well. That is what we will put on the right hand side of our Important to Me/Important to the Author chart
- Read *The Right Word: Roget and His Thesaurus* and write down facts/details that are important to me/the class on the left and important to the author on the right. Have students share what they find important along the way. Discuss what the author's big idea is.

- Students will complete the Think Sheet as we co-construct the anchor chart.
- Color in self-reflection on the bottom.

Close

- Why did Roget invent?
- How did Roget solve a problem?
- What do you do with an idea?

Whole Group - Introduce Independent Reading Project

- Ask: Who are some inventors you want to learn more about?
- To coincide with our nonfiction unit on inventors, you will choose and read a biography about an inventor that interests you and had an idea. You will learn what he/she did with his/her ideas.
- Ask: How might you go about deciding what book you want to read? Interests/Lexile
- Show students the classroom selection of inventor biographies as well as the book list with Lexile. (Students should already know their Lexile based on NWEA scores. This will have been communicated with students earlier in the year, but they may need a refresher.) If you need help knowing what a good Lexile is for you, please let me know.
- I would like you to have a book chosen and brought to school by next Monday.
- Ask: Any questions?
- Provide time to peruse classroom options and book lists.

Independent/Partner - Know vs. No?

- Students should go to their desks.
- Project Know vs. No? on the interactive white board.
- Inform students how to fill out the form.
- Read aloud the words so that students know how to pronounce them so decoding does not interfere with their knowledge of the word.
- If students can use the word in a sentence, they can do so at the bottom of the page.
- Once all students have finished, they can pair up and discuss their choices with a partner.

Assignment

- Brainstorm an inventor that interests you.
- Find an inventor biography that interests and is appropriate for you by Monday.

Assessment

- Important to Me/Important to the Author Think Sheet
- Know vs. No?

Name _____

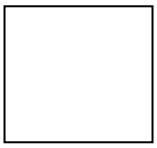
Important to Me/Important to the Author Think Sheet

Important to Me	Important to the Author

Self-Reflection: Color the box using the descriptions below.

- I can determine the difference between what I think is most important and the writer's big ideas.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Know vs. No?

- How well do you know these words?
- Mark each word to show your understanding.
- Discuss your choices with a partner.

Word	Don't know it at all	Have seen it or heard it	Have a guess about its meaning	Can use in a sentence	Am an expert on this word
inventor					
brainstorm					
opportunity					
engineer					
device					
factory					
manufacture					
prototype					
patent					
lawyer					

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Marie Curie: Brave Scientist

by: Brandt, Keith
A brief biography focusing on the youth of the scientist who twice received the Nobel Prize ...

Pages: 48 **ISBN13:** 9780893758561

1070L

Geeks: How Two Lost Boys ...

by: Katz, Jon
Jesse and Eric were geeks: suspicious of authority figures, proud of their status as outsiders, fervent ...

Pages: 256 **ISBN13:** 9780767906999

790L

Who Was Thomas Alva Edison?

by: Frith, Margaret
One day in 1882, Thomas Edison flipped a switch that lit up lower Manhattan with incandescent ...

Pages: 112 **ISBN13:** 9780448437651 **Ages:** 8 to 12

1000L

Isaac Newton

by: Krull, Kathleen
What was Isaac Newton like? Secretive, vindictive, withdrawn, obsessive, and, oh, yes, brilliant. His imagination was ...

Pages: 128 **ISBN13:** 9780670059218 **Ages:** 8 to 12

Henry Ford and the Model ...

GN630L

by: O'Hearn, Michael
In graphic novel format, tells the story of Henry Ford and his popular Model T automobile.

Pages: 32 **ISBN13:** 9780736864800

Johann Gutenberg and the Printing ...

GN620L

by: Olson, Kay Melchisedech
In graphic novel format, tells the story of Johann Gutenberg and the invention of the printing ...

Pages: 32 **ISBN13:** 9780736864824

Levi Strauss and Blue Jeans

GN600L

by: Olson, Nathan
In graphic novel format, tells the story of Levi Strauss and the evolution of blue jeans.

Pages: 32 **ISBN13:** 9780736864848

Benjamin Franklin: An American Genius

GN610L

by: Olson, Kay Melchisedech
In graphic novel format, tells the life story of American statesman and inventor Benjamin Franklin.

Pages: 32 **ISBN13:** 9780736846295

George Washington Carver: Ingenious Inventor

GN600L

by: Olson, Nathan
In graphic novel format, tells the life story of the plant scientist and inventor George Washington ...

Pages: 32 **ISBN13:** 9780736854849

Thomas Edison: Inventor, Scientist, and ...

700L

by: Mortensen, Lori
Discusses the life of inventor Thomas Alva Edison, who changed the world in which he lived ...

Pages: 24 **ISBN13:** 9781404831056

George Eastman and the Kodak ...

GN620L

by: Fandel, Jennifer; Milgrom, Al
Graphic novel format story of George Eastman, whose invention of the hand-held camera revolutionized people's lives.

Pages: 32 **ISBN13:** 9780736868488

Marie Curie

1050L

by: Krull, Kathleen
Talk about a ?glowing reputation?! Marie Curie, the woman who coined the term radioactivity, won not ...

Pages: 144 **ISBN13:** 9780670058945 **Ages:** 8 to

George Washington Carver: Teacher, Scientist, ...

730L

by: Mortensen, Lori
Brief biography highlights some important events in the life of George Washington Carver, teacher, scientist, and ...

Pages: 24 **ISBN13:** 9781404837256

Louis Braille

680L

by: Donaldson, Madeline
Biography of the blind French boy who invented the Braille alphabet when he was only fifteen.

Pages: 48 **ISBN13:** 9780822576082

Albert Einstein: Universal Genius

910L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531149751

Marie Curie: Scientist Who Made ...

840L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531149775

Nikola Tesla: Physicist, Inventor, Electrical ...

1010L

by: Burgan, Michael
Biography of physicist Nikola Tesla, who developed the alternating current electric power system that lights up ...

Pages: 112 **ISBN13:** 9780756540869

Bill Gates

1130L

by: Aronson, Marc
Bill Gates is many things: the richest person in the world; the ruthless businessman who co-founded ...

Pages: 192 **ISBN13:** 9780670063482

Tales of Famous Americans

740L

by: Roop, Connie; Roop, Peter
A perfect introduction to some of the people who built, changed, and challenged the U.S.A., Tales ...

Pages: 112 **ISBN13:** 9780439641166 **Ages:** 8 to 11

Ben Franklin: Inventing America

1150L

by: Fleming, Thomas
Perhaps more than even Washington, Jefferson, or Adams, Ben Franklin is the Founding Father who best ...

Pages: 192 **ISBN13:** 9781402741432 **Ages:** 12 to Young Adult

(19+)

Benjamin Franklin: Electrified the World ...

910L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531237014 **Ages:** 8 to 11

Steve Jobs and Steve Wozniak: ...

940L

by: Venezia, Mike
An introduction to the lives and careers of Steve Jobs and Steve Wozniak, founders of Apple ...

Pages: 32 **ISBN13:** 9780531237304 **Ages:** 8 to 11

Louis Pasteur and Pasteurization

GN770L

by: None
ISBN13: 9781406215700

Bill Gates: Entrepreneur and Philanthropist

1040L

by: Lesinski, Jeanne M.
A biography of the man who created Microsoft, from his childhood to his battle in court ...

Pages: 112 **ISBN13:** 9781580135702 **Ages:** 11 to 14

Alexander Graham Bell Graphic Biography

GN530L

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Pages: 25 **ISBN13:** 9781599052137 **Ages:** 12 to 18

Marie Curie Graphic Biography

GN530L

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Pages: 25 **ISBN13:** 9781599052267 **Ages:** 12 to 18

Walt Disney Graphic Biography

GN760L

Fast-paced and easy-to-read, these softcover 25-page graphic biographies teach students about historical figures: those who lead ...

Pages: 25 **ISBN13:** 9781599052304 **Ages:** 12 to 18

It's a Snap!: George Eastman's ...

470L

by: Kulling, Monica
In 1877 in Rochester, New York, George Eastman couldn't understand why picture-taking was so difficult. Having ...

Pages: 32 **ISBN13:** 9780887768811 **Ages:** 5 to 8

Thomas Edison: Incredible Inventor

620L

by: Tourville, Amanda Doering

Pages: 32 **ISBN13:** 9781616419363 **Ages:** 5 to 9

Who Invented Basketball? James Naismith

690L

by: Latta, Sara L.

Pages: 24 **ISBN13:** 9780766039650 **Ages:** 5 to 8

George Washington Carver

520L

by: McKissack, Fredrick; McKissack, Patricia

Pages: 24 **ISBN13:** 9780766041028 **Ages:** 5 to 8

The Story of Thomas Alva ...

950L

by: Cousins, Margaret

Beginning with Thomas Edison's childhood, when he set up his first laboratory in his basement as ...

Pages: 192 **ISBN13:** 9780394848839

The Story of Benjamin Franklin: ...

760L

by: Davidson, Margaret

Ben Franklin was an amasing American because he was: * a printer and businessman who created ...

Pages: 96 **ISBN13:** 9780440400219

George Washington Carver

950L

by: Labreque, Ellen

Pages: 32 **ISBN13:** 9781410962409 **Ages:** 7 to 9

George Washington Carver

950L

by: Labreque, Ellen

Pages: 32 **ISBN13:** 9781410962478 **Ages:** 7 to 9

Louis Pasteur

940L

by: Hunter, Nick

Pages: 32 **ISBN13:** 9781406272482 **Ages:** 7 to 9

Who Is Bill Gates?

720L

by: Demuth, Patricia Brennan

Pages: 112 **ISBN13:** 9780448463322 **Ages:** 8 to 12

Who Was Milton Hershey?

780L

by: Buckley Jr., James

Pages: 112 **ISBN13:** 9780448479361 **Ages:** 8 to 12

Johann Gutenberg and the Amazing ...

AD1240L

by: Koscielniak, Bruce
If a book was published 600 years ago, it would have been copied out by hand ...

Pages: 40 **ISBN13:** 9780618263516

Levi Strauss Gets A Bright ...

AD610L

by: Johnston, Tony

Pages: 32 **ISBN13:** 9780152061456 **Ages:** 5 to 7

To Fly: The Story of ...

780L

by: Old, Wendie C.
Orville and Wilbur Wright were a fascinating pair. Not only did they invent, build, and fly ...

Pages: 48 **ISBN13:** 9780618133475

Sir Isaac Newton and the ...

800L

by: Weir, Jane
Isaac Newton is considered one of the greatest scientists who ever lived. His work changed the ...

Pages: 32 **ISBN13:** 9780743905749

Out of Darkness: The Story ...

1000L

by: Freedman, Russell
A biography of the modest Frenchman who, after being blinded at the age of three, went ...

Pages: 96 **ISBN13:** 9780395775165

Who Was Louis Braille?

780L

by: Frith, Margaret

Pages: 112 **ISBN13:** 9780448479033 **Ages:** 8 to 12

Click!: A Story about George ...

770L

by: Mitchell, Barbara
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 56 **ISBN13:** 9780876144725

Alexander Graham Bell

650L

by: McPherson, Stephanie Sammartino
An introduction to the life and career of the inventor Alexander Graham Bell.

Pages: 48 **ISBN13:** 9780822585435

Mr. Blue Jeans: A Story ...

960L

by: Weidt, Maryann N.
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 64 **ISBN13:** 9780876145883

Who Were the Wright Brothers?

890L

by: Buckley Jr., James

Pages: 112 **ISBN13:** 9780448479514 **Ages:** 8 to 12

George Washington Carver

NC790L

by: Colins, Luke

Pages: 24 **ISBN13:** 9781476539577 **Ages:** 5 to 7

Who Was Alexander Graham Bell?

720L

by: Bader, Bonnie

Pages: 112 **ISBN13:** 9780448464602 **Ages:** 8 to 12

George Washington Carver

930L

by: MacLeod, Elizabeth

Pages: 32 **ISBN13:** 9781553379072 **Ages:** 8 to 12

Ben Franklin: His Wit and ...

760L

by: Schroeder, Alan

Benjamin Franklin devised armonicas and bifocals, helped bring us the Constitution and signed the Declarion of ...

Pages: 32 **ISBN13:** 9780823424351 **Ages:** 8 to 11

Who Was Marie Curie?

690L

by: Stine, Megan

Pages: 106 **ISBN13:** 9780448478968 **Ages:** 8 to 10

Who Was Isaac Newton?

840L

by: Pascal, Janet B.

Pages: 112 **ISBN13:** 9780448479132 **Ages:** 8 to 10

Who Was Walt Disney?

720L

by: Stewart, Whitney

Walt Disney always loved to entertain people. Often it got him into trouble. Once he painted ...

Pages: 112 **ISBN13:** 9780448467030 **Ages:** 8 to 12

Who Was Steve Jobs?

660L

by: Pollack, Pam

Pages: 112 **ISBN13:** 9780448479408 **Ages:** 8 to 12

Marie Curie

1050L

by: Krull, Kathleen

Talk about a ?glowing reputation?! Marie Curie, the woman who coined the term radioactivity, won not

...

Pages: 144 **ISBN13:** 9780142412657 **Ages:** 8 to 12

Who Was Robert Ripley?

850L

by: Anderson, Kirsten

Pages: 112 **ISBN13:** 9780448482989 **Ages:** 8 to 12

Who Was Ben Franklin?

600L

by: Fradin, Dennis Brindell

Pages: 112 **ISBN13:** 9780448466767 **Ages:** 8 to 12

Who Was George Washington Carver?

910L

by: Gigliotti, Jim

Pages: 112 **ISBN13:** 9780399539732 **Ages:** 8 to 12

Who Was George Washington Carver?

910L

by: Gigliotti, Jim

Pages: 112 **ISBN13:** 9780448483122 **Ages:** 8 to 12

Isaac Newton

980L

by: Steele, Philip

Born in England in 1643, Isaac Newton grew up in the age when Renaissance thinkers were ...

Pages: 64 **ISBN13:** 9781426314506 **Ages:** 8 to 12

George Washington Carver

570L

by: Kitson, Jazynka

Pages: 32 **ISBN13:** 9781426322853 **Ages:** 3 to 7

Day 3: Problem Solving Centers

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Problem Solving Centers – Student Table
- Problem Solving Center options
- See specific Problem Solving Centers for list of materials

Objective:

- Use a variety of ways to synthesize information and share their learning.

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – Introduce Problem Solving Centers

- Have students view the learning profile they completed at the start of the year. Remind students that they/we all have different strengths that Psychologist Howard Gardner refers to as intelligences. Go through the different ways of being smart: musical (music notes), bodily-kinesthetic (ball), linguistic (book), logical-mathematical (numbers), framed artwork (spatial), naturalist (leaf), intrapersonal (striped shirt), interpersonal (zigzagged shirt)
- Provide a few minutes to discuss what students placed in their hands and why and how they designed their a couple students share what they put in the hands.
- Go through the Problem Solving Centers - Student Table and requirements.
    - Over the next four weeks, you must do at least one activity from each of the eight centers.
    - Record the date and the activity option you chose in the correct box below.
- Behavior expectations:
    - Follow classroom expectations established as a class at the beginning of the school year.
    - Students may choose where to start each day as long as they participate in one activity within each Problem Solving Center by the end of the unit.
    - Remind students that whatever materials they take out need to be returned to the correct Problem Solving Center when they are done with each activity.

Independent/Small Group – Problem Solving Centers

- Let students explore and read through the Problem Solving Center options before starting.
- While students explore and complete the Problem Solving Centers, walk around the room clarifying tasks, asking questions, assisting students who need help.
- Give a five minutes warning so students have time to complete a center activity.

Close - Reflection

- Ask what students thought about the Problem Solving Centers – what they found exciting, challenging, fun.
- Ask students what went well and what can be improved for the next Problem Solving Center time.

Assignment

- Brainstorm an inventor that interests you.
- Find an inventor biography that interests and is appropriate for you by Monday.

Assessment

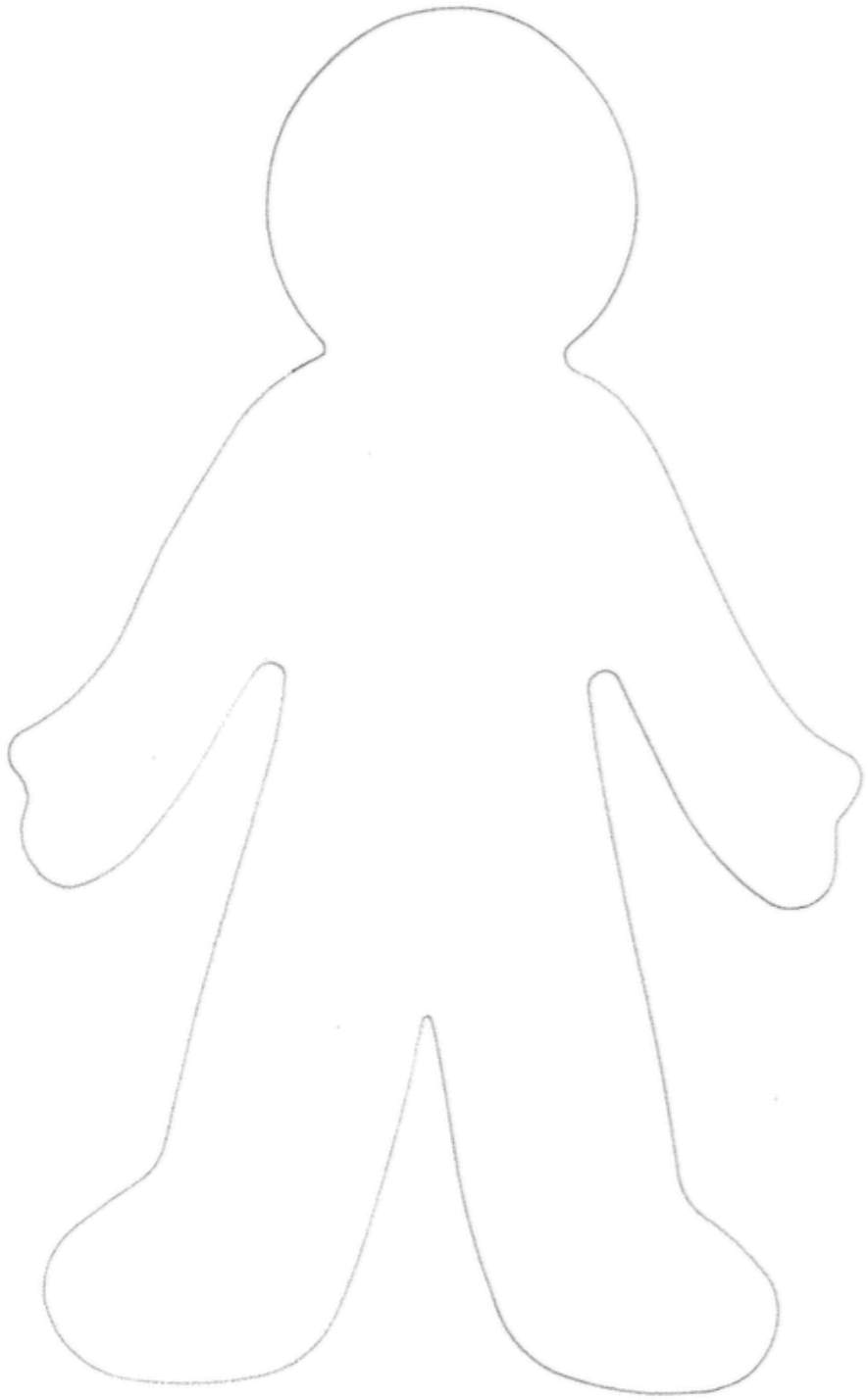
- Problem Solving Centers – Student Table
- Anecdotal Notes

Learning Profile

*Your face and hair should represent who you are and what you look like now.

* You can draw or cut out additional things that you want me to know about you and add them to your person.

* Remember, you will be cutting this out neatly once you are done.



Shirt/top

- Stripes if you prefer to work alone
- Polka dots if you prefer to work with a partner
- Zig zags if you prefer to work in groups

Pants/skirt/shorts/capris

- Green if you are good in math
- Yellow if you are good at science
- Blue if you are a good reader
- Orange if you are good in social studies

Shoes

- Red if you learn best by reading and writing
- Brown if you learn best by doing things
- Purple if you learn best by discussing and talking about what you are learning

In your hand

Draw 

if you love music, like to sing and play instruments

Draw 

if you like to exercise, play sports, and move

Draw 

if you like to read, write, talk, and listen.

Draw 

if you like numbers of all sorts, patterns, and solving problems

---

Draw 

if you enjoy photography, are good with directions, good at drawing, and can visualize pictures in your head

---

Draw 

if you like to learn about nature, enjoy gardening, like having pets, appreciate the outdoors

	Stripes – alone	Polka dots- partner	Zig zags -group		Green –Math	Yellow –Science	Blue – Reading	Orange –Social Studies		Red – Reading and Writing	Brown –doing things	Purple – discussing/talking		Notes- music	Ball –kinesthetic	Book – read, write, talk	Numbers –numbers/ patterns/problem solving	Picture frame – photography, directions, drawing, visualize pictures in head	Leaf – nature, gardening, pets, outdoors			
1.																						
2.																						
3.																						
4.																						
5.																						
6.																						
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Problem Solving Centers - Anecdotal Notes

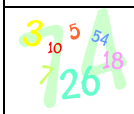
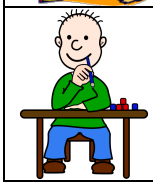
	Week 1 Observations
List student names here	

Name _____

Problem Solving Centers – Student Table

Requirements:
Over the next four weeks, you must do at least one activity from each of the eight centers. Record the date and the activity option chosen in the correct box below.

As you go to each center, think about the following questions:
Why do people invent?
How do inventors solve problems?
What do you do with an idea?

	Week 1	Week 2	Week 3	Week 4
				
				
				
				
				
				
				
				

Musical Problem Solving Center

1. Write an advertising jingle.

2. Make a list of songs that calm, stimulate, or inspire you.

3. Make a musical instrument using the materials provided.

4. Create new lyrics to a pre-existing song/rhyme/rhythm.

5. Add sound effects to a story using instruments/items around the classroom.

Bodily-Kinesthetic Problem Solving Center

1. Explore with pool noodle pieces and toothpicks or play dough. Build. Sculpt. Create.

2. Engineer a new drinking straw and see if it works using straws and cups.

3. Create an obstacle course using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops.

4. Build a working pulley using: cardboard tubes, lids, pencils, cups, strings, spools

5. Build a catapult using: tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power.

Linguistic Problem Solving Center

1. Write a thank you note to an inventor expressing your gratitude for his/her contributions to the world and/or his/her creativity and ability to solve problems.

2. Solve word finds, crossword puzzles, or create your own word puzzle.

3. Create a book/list of fun facts about an inventor.

4. Read Roget's original thesaurus. Compare and contrast it to *Roget's 21st Century Thesaurus.* Create lists like Roget.

5. Write a fantasy about an inventor and his/her creation. Think: Mary Shelley who created *Frankenstein*.

Logical-Mathematical Problem Solving Center

1. Create patterns, designs, and imaginary figures using tangrams or geoboards and geobands.

2. Using clothes pins and playing cards, create a pattern or game.

3. Using the binary alphabet code provided, create words/messages with Legos and a base plate.
   - 1= White 0= Blue
   - https://www.kidscodecs.com/a-binary-numbers-tutorial-with-1-and-0/

4. Explore measurement with the following supplies: tape measure, ruler, wood pieces, pencil

5. Look at the patents. What is similar and different about the patents? What do you find interesting?

Spatial Problem Solving Center

1. Assemble environmental print puzzles using magazines, cardboard food boxes, and junk mail.

2. Create using the torn paper, paint spills, bent paper, coffee stains, holes, crumpled paper. Reference *Beautiful Oops!* by Barney Saltzberg if you need inspiration.

3. Build a Lego maze testing it with a marble.

4. Map an obstacle course onto graph paper using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops

5. Think of a complex way to solve a simple problem. Then create a Rube Goldberg inspired comic. Reference the Rube Goldberg comic book.

Naturalist Problem Solving Center

1. Collect items outside at recess. Create something with your artifacts.

2. Imagine you are in one of the scenic pictures provided. What are you feeling, experiencing, doing?

3. Photograph and print an image from the outdoors. Write a description, caption, and/or poem for your photograph.

4. Using a microscope, explore different slides. What do you see?

5. Brainstorm and record solutions to environmental problems. Example: the problem with trash, how to prevent/clean up oil spills, how to decrease our environmental footprint

Interpersonal Problem Solving Center

1. Create an advertisement for an invention that has helped you. Make sure to show the product and persuade the audience/buyer/customer why they need the invention/product.

2. Play Mouse Trap.
    - View life-sized Mouse Trap: https://www.youtube.com/watch?v=Rdqrdw8qt3Y

3. Build a tic-tac-toe board using Legos and a base plate. Then play tic-tac-toe with a partner.

4. Invent a new game to play with others using cardboard and miscellaneous items from container

5. Create a skit that demonstrates one of the unit vocabulary words: brainstorm, factory, manufacture, production, engineer, patent, device, opportunity, prototype, lawyer. Look up the word in the dictionary to confirm the definition.

Intrapersonal Problem Solving Center

1. Imagine and journal about life without one of your favorite inventions (books, light switch, refrigerator, bicycle, pencil).

2. Read about a topic that interests you.

3. Reflect on a way to solve a problem. Write down your problem and solution.

4. Spend time in quiet thought.

5. Set a goal for a problem you would someday like to solve. Write your goal in your reading response notebook

For Teacher Reference

Musical Problem Solving Center Materials :

1. paper and pencil
2. paper and pencil
3. recyclable materials
4. paper and pencil
5. instruments

Bodily-Kinesthetic Problem Solving Center Materials:

1. pool noodle pieces, toothpicks and play dough
2. straws, straw making kit from dollar store, mini cups
3. 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, 5 hula hoops
4. cardboard tubes, lids, pencils, cups, strings, spools
5. tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power
   Idea from http://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/

Linguistic Problem Solving Center Materials:

1. paper and pencil
2. word finds, crossword puzzles, paper
3. paper and pencil
4. Roget's original and 21st century thesaurus
5. paper and pencil

Logical-Mathematical Problem Solving Center Materials:

1. tangrams, geoboards and geobands
2. clothes pins and decks of cards
3. Binary code sheet, Legos: white, blue, and one additional color, base plate
4. tape measure, rule, wood pieces, pencil
5. printouts of patents

Spatial Problem Solving Center Materials:

1. cut up magazines, food boxes, and junk mail
2. torn paper, paper with paint spills, bent paper, coffee stained paper, paper with holes, crumpled paper
3. Legos, base plate, marble
4. graph paper and pencil
5. Rube Goldberg comic book, paper, pencil, colored pencils

Naturalist Problem Solving Center Materials:

1. bucket to collect artifacts
2. calendar of outdoor scenes
3. camera and printer, paper and pencil
4. microscope and slides
5. paper and pencil

Interpersonal Problem Solving Center Materials:

1. props
2. Mouse Trap game
3. Legos and base plate
4. cardboard and miscellaneous items to serve as game pieces
5. dictionary, props

Intrapersonal Problem Solving Center Materials:

1. journal, reading response notebook and pencil
2. book corner
3. paper and pencil
4. quiet space
5. reading response notebook and pencil

Day 4: ***Marvelous Mattie: How Margaret E. Knight Became an Inventor***

Grade Level: 4

Essential Questions:

- Why did Mattie invent?
- How did Mattie solve a problem?
- What do you do with an idea?

Materials:

- Flat bottom brown bag and flat bag
- Book: *Marvelous Mattie: How Margaret E. Knight Became an Inventor* by Emily Arnold McCully
- Word/Inferred Meaning/Clues/ Sentence Think Sheet and anchor chart
- *My Crazy Inventions Sketchbook: 50 Awesome Drawing Activities for Young Inventors* by Lisa Regan illustrated by Andrew Rae

Objectives:

- Draw inferences from images, features, and words.
- Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area. CCSS 4.2.4.4

Multiple Intelligences:

- Linguistic
- Logical-Mathematical
- Spatial
- Intrapersonal

Procedure

Whole Group - Read aloud

Introduce

- Show flat bottom brown bag and flat bag.
- What are the differences?
- Which bag would you want to take with you grocery shopping? Why?

Practice

- Inform students that readers can figure out the meaning of unfamiliar words by taking what they know and gathering clues in the text to track the meaning of vocabulary. Readers need to consider the context to understand what they read. *Strategies That Work* p. 139-140
- Introduce four-column Think Sheet headed Word/Inferred Meaning/Clues/Sentence. Students should raise their hands when they come to a word they have never heard before.
- Read *Marvelous Mattie.*
    - When students raise their hands, stop and fill in the think sheet.
    - Model:
        - Write the word in the first column.
        - Think through how to crack the meaning of that term. Read on, reread, look at photographs, pictures, etc.
        - Continue to fill in the inferred meaning, the clue that helped infer.

        - Together with the kids, write a sentence in the final column. Writing the sentence demonstrates understanding of the word.
    - Co-construct the Word/Inferred Meaning/ Clues/Sentence anchor chart while reading *Marvelous Mattie,* providing the same Think Sheet to students.

Close

- Why did Mattie invent?
- How did Mattie solve a problem?
- What do you do with an idea?

Potential Vocabulary Words

widowed inherited whirligig brainstorm gust textile mill rent factory complex (of mills) overseers looms manufacture locomotive	clattered halted production sequence of events shuttle vigil missiles (of the shuttles) scribbling idea took shape engineer impressed installing patent	device opportunity grocers bulky sketched rooming house gingerly proceeded prototype recast uniform (machine produced uniform, square-bottomed bags) machinist	lawyer testify persuade took the stand testimony priority (of invention) disgraced representative verdict outright obituary

Independent – Invention Sketch Time

- Provide time for students to think like an inventor.
- Give options for creative ways to solve problems using ideas from *My Crazy Inventions Sketchbook: 50 Awesome Drawing Activities for Young Inventors* by Lisa Regan illustrated by Andrew Rae
- Share if time permits.

Assignment

- Brainstorm an inventor that interests you.
- Find an inventor biography that interests and is appropriate for you by Monday.

Assessment

- Word/Inferred Meaning/Clues/Sentence Think Sheet

Name _____

Word/Inferred Meaning/Clues/Sentence Think Sheet Example

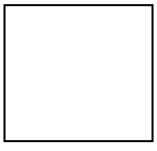
As you read, jot down unfamiliar words and use the context to infer the meaning.

Word	Inferred Meaning	Clues (picture/reading on/capital letters)	Sentence
inherited	received	picture	When his grandfather died, Melvin inherited his grandfather's harmonica.
gust	surge	reading on	The gust of wind pushed the leaves across the yard.
textile mills	buildings where cloth is made	reading on a few pages and pictures	There were many machines in the textile mills.

Self-Reflection: Color the box using the descriptions below.

- I can determine the meaning of general academic and domain-specific words or phrases in a text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Word/Inferred Meaning/Clues/Sentence Think Sheet

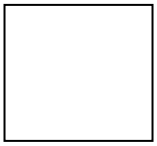
As you read, jot down unfamiliar words and use the context to infer the meaning.

Word	Inferred Meaning	Clues (picture/reading on/capital letters)	Sentence

Self-Reflection: Color the box using the descriptions below.

- I can determine the meaning of general academic and domain-specific words or phrases in a text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Ideas from *My Crazy Inventions Sketchbook: 50 Awesome Drawing Activities for Young Inventors* by Lisa Regan illustrated by Andrew Rae

Design your own vehicle that does two jobs in one.

What are these rotors keeping up in the air?

https://upload.wikimedia.org/wikipedia/commons/5/54/Taketombo.JPG

Invent a toy... just for fun

Invent a gadget that covers all of your morning requirements.

- Someone has dreamed up and alarm clock that cooks breakfast by your bed! The 'Wake N Bacon' works by waking you with the aroma of sizzling rashers – allegedly.

- The 'Clocky' alarm is a tiny root on wheels that runs away, beeping loudly, so you have to jump out of bed and catch it to turn it off. Now you're wide awake!

Customize a shoe for maximum performance – or just maximum style.

Have you ever come up with an amazing idea just by lying on the grass, gazing into the summer sky? That's how these things happen...

What do you dream of inventing?

Day 5: *In the Bag! Margaret Knight Wraps It Up*

Grade Level: 4

Essential Questions:

- Why did Mattie invent?
- How did Mattie solve a problem?
- What do you do with an idea?

Materials:

- Book: *In The Bag! Margaret Knight Wraps It Up* by Monica Kulling illustrated by David Parkins
- Picture of moth with spots that look like eyes
- BK + TC = I Think Sheet and anchor chart
- Sticky notes
- Web Quest form
- "Lady Edison" Response Sheet
- Margaret E. Knight links on webpage
- Access to computers with internet

Objectives:

- Draw inferences from images, features, and words.
- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. CCSS 4.2.1.1
- Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. CCSS 4.2.9.9

Multiple Intelligences:

- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group - Read aloud

<u>Introduce</u>

- Explain how to make inferences by playing a version of charades – facial expression charades. Idea from *Inquiry Circles in Action* by Harvey and Daniels
  - Make a face that looks frightened and ask kids what they infer.
  - Act as if you are crying and ask what they infer.
  - If they saw scared the first time and sad the second, explain to them that they are inferring.
  - They are taking what they know, their background knowledge, and merging it with clues.
  - Do a couple examples with a nearby partner.
- Have Word/Inferred Meaning/Clues/Sentence think sheet visible to reference while reading.

Practice

- Share how you take what you know and merge it with text clues to make an inference. BK + TC = I (Background Knowledge plus Text Clues equals Inference)
- Explain that when the information is not written in the text, you often have to infer to find an answer.
- Show a picture of a moth with large spots that look like eyes. Share how you infer that these spots are to keep away predators because you know moths could be eaten by larger creatures.
- Read *In The Bag! Margaret Knight Wraps It Up*
- Have students share inferences throughout the read aloud. Place sticky notes in the book where students/teacher made inferences.

Close

- Think: Why was Margaret E. Knight named "Lady Edison" in her obituary?

Independent – "Lady Edison" Web Quest

- Using the links on my webpage, jot down details that help answer the question: Why was Margaret E. Knight named "Lady Edison" in her obituary?
- Write down the site where you found your information.
- Use what you learned from your web quest and evidence from *In The Bag! Margaret Knight Wraps It* and *Marvelous Mattie: How Margaret E. Knight Became an Inventor* to answer: Why was Margaret E. Knight named "Lady Edison" in her obituary?
- Include a topic sentence, at least three supporting details, followed by a concluding sentence.

Assignment

- Brainstorm an inventor that interests you.
- Find an inventor biography that interests and is appropriate for you by Monday.

Assessment

- "Lady Edison" Response Sheet

Additional Resources

Website with many ideas/extensions related to Marvelous Mattie
http://www.truestorytime.com/blog/marvelous-mattie-how-margaret-e-knight-became-an-inventor
Patent of one of Margaret Knight's Inventions
https://commons.wikimedia.org/wiki/File:US436358-Sole_cutting_machine_(2).jpg
Biography of Margaret Knight with photo of her paper bag machine

https://www.asme.org/engineering-topics/articles/diversity/margaret-knight
Biography of Margaret Knight from National Women's History Museum
https://www.nwhm.org/education-resources/biography/biographies/margaret-knight/
Short biography of Margaret Knight
https://pvhn2.wordpress.com/1800-2/margaret-e-knight/
Another biography of Margaret Knight
http://www.women-inventors.com/Margaret-Knight.asp
Website of inventors during the Industrial Revolution
http://americanhistory.about.com/od/industrialrev/tp/inventors.htm
Student video about Margaret E. Knight
https://www.youtube.com/watch?v=vaw4WX_SgOY

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[1] Retrieved from https://pixabay.com/static/uploads/photo/2013/12/28/23/41/butterfly-234915_960_720.jpg.
[2] Retrieved from https://pixabay.com/static/uploads/photo/2013/03/14/20/04/comet-moth-93651_960_720.jpg.
[3] Retrieved from https://pixabay.com/static/uploads/photo/2013/12/29/00/36/caligo-eurilochus-234947_960_720.jpg.
[4] Retrieved from https://pixabay.com/static/uploads/photo/2014/05/07/20/07/butterfly-339883_960_720.jpg.
[5] Retrieved from https://upload.wikimedia.org/wikipedia/commons/1/1b/Luna_moth_eye_spot.jpg.
[6] Retrieved from https://upload.wikimedia.org/wikipedia/commons/b/b1/Boomerang_Owl,_Tambopata,_Peru.jpg.

Name _____

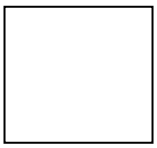
BK + TC = I (Background Knowledge + Text Clues = Inference) Think Sheet

BK	+	TC	=	I
	+		=	
	+		=	
	+		=	

Self-Reflection: Color the box using the descriptions below.

- I can refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Web Quest: *Why was Margaret E. Knight named "Lady Edison" in her obituary?*

- Using the links on my webpage, jot down details that help answer the question: Why was Margaret E. Knight named "Lady Edison" in her obituary?
- Write down the site where you found your information.

Detail: Site:	Detail: Site:
Detail: Site:	Detail: Site:
Detail: Site:	Detail: Site:

Name _____

"Lady Edison"

- Use what you learned from your web quest and evidence from *In The Bag! Margaret Knight Wraps It* and *Marvelous Mattie: How Margaret E. Knight Became an Inventor* to answer: Why was Margaret E. Knight named "Lady Edison" in her obituary?
- Include a topic sentence, at least three supporting details, followed by a concluding sentence.

_____

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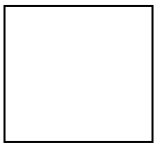
Self-Reflection: Color the box using the descriptions below.

- I can refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Day 6: Introduce Independent Reading Project

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Independent Reading timeline/map
- R.A.F.T. Project Options and Rubric
- Independent Reading nonfiction bookmarks
- Independent Reading Conference Form-Biography

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Linguistic
- Intrapersonal

Procedure

Whole Group – Introduce Independent Reading Project

- Inform students about the independent reading project.
  - They will read their inventor biography/biographies (if picture books) over the course of the next two weeks.
  - As they read, they can use the nonfiction reader bookmark they received at the beginning of the school year to stop, think, and jot as they read. If necessary, refresh students on how to use the bookmark.
  - Students should take out their biographies to map out their reading.
  - Show students how to break down the reading each day/week.
- Go over R.A.F.T. project options, rubric, work time, and due date.

Independent – Read inventor biography

Independent reading conferences

- Check in with students using the Independent Reading Conference Form-Biography

Assessment

- Independent reading conferences

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Name _____

Independent Reading Project– Biography

Use this form to map out your reading over the next two weeks.

Ideas:

- Write out how many pages and chapters you should read in a day/week.
- If you are reading multiple biographies about your inventor, write when you would like to read each book.
- Some reading may need done at home.

Name of Inventor _____

Book Title(s) _____

_____

_____

Week 1	Week 2
Monday: 30 minutes in class	Monday: 30 minutes in class
Tuesday: 30 minutes in class	Tuesday:
Wednesday:	Wednesday:
Thursday:	Thursday:
Friday:	Friday: 45 minutes in class

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
Researcher 	Fourth grade students	Timeline	Create a timeline of 10 important life events (dates and descriptions), along with at least five pictures.
Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

Name _____

Independent Reading Conference Form – Biography

Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:
Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:

Potential teacher questions (to dig deeper):

- *What challenges did this person face? How did he/she work to overcome these challenges?*
- *Describe a difficult decision the person had to make. Do you think you would have made the same choice? Why?*
- *What do most people think is this person's most significant accomplishment? Do you think the person would agree that this was the most important thing he/she did? Why or why not?*
- *Why would an author write a biography about this individual?*
- *From what you have read so far, tell about an event that was very influential on the choices the person made in his/her life.*
- *What do you admire about the person in this biography? Why? How might you become more like this person?*
- *What do you think school was like for the person about whom this biography was written? Explain.*

Day 7: *The Real McCoy: The Life of an African-American Inventor*

Grade Level: 4

Essential Questions:

- How did life as an African American impact Elijah's ability to invent?
- Why did Elijah McCoy invent?
- How did the Real McCoy solve a problem?

Materials:

- *Swing Low, Sweet Chariot* lyrics
- Music *Swing Low, Sweet Chariot* https://www.youtube.com/watch?v=Thz1zDAytzU
- Coded *Swing Low, Sweet Chariot* lyrics
- Book: *The Real McCoy: The Life of an African-American Inventor* by Wendy Towle Paintings by Wil Clay
- Facts/Questions/Response Think Sheet and anchor chart
- Independent Reading Conference Form-Biography

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Musical
- Linguistic
- Intrapersonal

Procedure

Whole Group - Read aloud

Introduce

- Inform students that African Americans sang spirituals when escaping slavery via the Underground Railroad.
- Distribute lyrics to African spiritual *Swing Low, Sweet Chariot.*
- Listen/Sing *Swing Low, Sweet Chariot.* https://www.youtube.com/watch?v=Thz1zDAytzU
- Show the coded lyrics for *Swing Low, Sweet Chariot* and discuss the meaning of the song.

Practice

- Read *The Real McCoy: The Life of an African-American Inventor* aloud.
- Model the kind of thinking expected of students.
  - Discuss what was just read and jot down important facts.
  - Work across the page to record the information and thinking.
- Continue to read, having students chime in with their own facts, questions, and

responses. Record their comments.

Close

- How did life as an African American impact Elijah's ability to invent?
- Why did Elijah McCoy invent?
- How did the Real McCoy solve a problem?

Independent – Read inventor biography and complete FQR Think Sheet

- Inform students they will read their inventor biography and complete a Facts/Questions/Response Think Sheet as they read

Independent reading conferences

- Check in with students using the Independent Reading Conference Form-Biography

Assessment

- Facts/Questions/Response Think Sheet
- Independent reading conferences

CODED LYRICS WORKSHEET
TEACHER NOTES

LYRICS	LITERAL MEANING	"CODED" - SECRET MEANING
Refrain:		
Swing low,	Come down	Come into slaveholding states
Sweet chariot,	Heavenly vehicle	The Underground Railroad
Comin' for to carry me home..	Taking me to heaven	Take me to freedom in the Northern states or Canada
Verses:		
I looked over Jordan, and what did I see?	I looked over the River Jordan, and what did I see?	I looked over the Mississippi or Ohio River, and what did I see?
A band of angels coming after me	A group of angels coming after me	Workers on the Underground Railroad coming to help me
If you get there before I do, tell all my friends I'm coming too	If you get there before I do, tell all my friends I'm coming too	If I have escaped friends or family, please tell them my escape plan
I'm sometimes up, I'm sometimes down	I'm sometimes up, I'm sometimes down	I have good days and bad days
But still my soul feels heavenly bound	But still my soul feels heavenly bound	But I know I will soon escape North on the Underground Railroad

Taken from:
http://bento.cdn.pbs.org/hostedbento-prod/filer_public/Underground%20Railroad%20William%20Still/Classroom/Lesson_HiddenMessages.pdf

Swing Low, Sweet Chariot Spiritual

Swing low, sweet chariot,
Coming for to carry me home,
Swing low, sweet chariot,
Coming for to carry me home.

I looked over Jordan, and what did I see?
Coming for to carry me home,
A band of angels coming after me,
Coming for to carry me home.

Swing low, sweet chariot,
Coming for to carry me home,
Swing low, sweet chariot,
Coming for to carry me home.

If you get there before I do,
Coming for to carry me home,
Tell all my friends I'm coming, too.
Coming for to carry me home.

Swing low, sweet chariot,
Coming for to carry me home,
Swing low, sweet chariot,
Coming for to carry me home.

I'm sometimes up and sometimes down,
Coming for to carry me home,
But still my soul feels heavenly bound,
Coming for to carry me home.

Swing low, sweet chariot,
Coming for to carry me home,
Swing low, sweet chariot,
Coming for to carry me home.

The brightest day that I can say,
Coming for to carry me home,
When Jesus washed my sins away,
Coming for to carry me home.

Swing low, sweet chariot,
Coming for to carry me home,
Swing low, sweet chariot,
Coming for to carry me home.

Name _____

FQR: Facts/Questions/Response Think Sheet Examples

Title *The Real McCoy: The Life of an African-American Inventor*

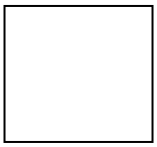
Author by Wendy Towle Paintings by Wil Clay

Facts	Questions	Response
Elijah McCoy was born in Canada to former slaves.	Why were Elijah's parents free in Canada, but not the United States? What spirituals did they sing when escaping slavery?	If I was Elijah's parents living during slavery in the South, I too would want to leave in search of freedom. They may have sung *Swing Low, Sweet Chariot*.
The McCoys were property owners so George McCoy could vote and send his children to public school.	Why could the McCoy children go to school in Canada, but not the United States?	Living in Canada during the mid-1800s must have been different than living in the United States at that time.
As a child, Elijah was interested in the way mechanical devices worked.	What machines did Elijah like to take apart and put back together?	I think this quality will enable Elijah to invent.

Self-Reflection: Color the box using the descriptions below.

- I can determine importance, ask questions, and respond to nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

FQR: Facts/Questions/Response Think Sheet

Title _____

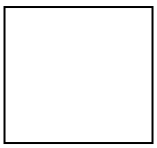
Author _____

Facts	Questions	Response

Self-Reflection: Color the box using the descriptions below.

- I can determine importance, ask questions, and respond to nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Independent Reading Conference Form – Biography

Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:
Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:

Potential teacher questions (to dig deeper):

- *What challenges did this person face? How did he/she work to overcome these challenges?*
- *Describe a difficult decision the person had to make. Do you think you would have made the same choice? Why?*
- *What do most people think is this person's most significant accomplishment? Do you think the person would agree that this was the most important thing he/she did? Why or why not?*
- *Why would an author write a biography about this individual?*
- *From what you have read so far, tell about an event that was very influential on the choices the person made in his/her life.*
- *What do you admire about the person in this biography? Why? How might you become more like this person?*
- *What do you think school was like for the person about whom this biography was written? Explain.*

Days 8 and 9: Problem Solving Centers and Main Idea/Details in Small Group

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Problem Solving Centers – Student Table
- Problem Solving Center Options
- Article: *For these students, if you can picture it, you can solve the problem* by Chicago Tribune, adapted by Newsela staff – 3 levels (approaching, on, and beyond)
- Brainpop video on main idea and details https://www.brainpop.com/english/writing/mainidea/
- Main Idea and Details Think Sheet

Objectives:

- Use a variety of ways to synthesize information and share their learning.
- Determine the main idea and details of a nonfiction text.
- Determine the main idea of a text and explain how it is supported by key details; summarize the text. CCSS 4.2.2.2

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – Review Problem Solving Centers

- Behavior expectations:
  - Follow classroom expectations established as a class at the beginning of the school year.
  - Students may choose where to start each day as long as they participate in one activity within each Problem Solving Center by the end of the unit.
  - Remind students that whatever materials they take out need to be returned to the correct Problem Solving Center when they are done with each activity.

Independent – Problem Solving Centers

Small Group – Main Idea and Details

- Over the next two days, meet with students based on reading readiness.
- The Newsela article, *For these students, if you can picture it, you can solve the problem,* is written at three different levels: approaching, on, and beyond 4th grade.
- Pass out three sticky notes to students.

- As students read the article, they should write down three important details from the text on the sticky notes.
- Once all students are done reading and writing their details, discuss commonalities among their details.
- Ask students to share the main idea (People and schools are finding value in combining art and science.) based on the sticky note details.
- Explain and assign the Main Idea and Details Think Sheet
    - Main Idea: What the text is mostly about or the big idea the author wants you to understand (can be topic sentence or concluding sentences in a paragraph)
    - Details: Facts and examples that help support the main idea
- Further Differentiation:
    - More advanced article options are available on Newsela.
    - Some groups may need more prompting/direct instruction while others may be ready for more independent practice.
    - Additional tool: free four-minute brainpop movie about main idea and details https://www.brainpop.com/english/writing/mainidea/
    - Provide the main idea; students find the details that support the main idea given.

Assessment

- Main Idea and Details Think Sheet
- Problem Solving Centers – Student Table

Name _____

Main Idea and Details Think Sheet

Main Idea: What the text is mostly about or the big idea the author wants you to understand (can be topic sentence or concluding sentences in a paragraph)

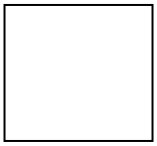
Details: Facts and examples that help support the main idea

Main Idea:
Detail 1:
Detail 2:
Detail 3:

Self-Reflection: Color the box using the descriptions below.

- I can determine the main idea and details in nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Picture this: Art, math and science meet at this Chicago school

By Chicago Tribune, adapted by Newsela staff on 04.08.15
Word Count **378**

Eugenia Cheng, a pure mathematician and visiting scientist, speaks to a combined physics and studio class called "Articulating Time and Space" about mathematical concepts at the School of the Art Institute of Chicago, March 18, 2015. Photo: Brian Cassella/Chicago Tribune/TNS

Eugenia Cheng is a math teacher. She wanted to explain something to her class.

Cheng cut a bagel into a strange shape. The shape is known as a Mobius strip. She began explaining why water cannot possibly have the same shape.

Imagination And "What If?"

Then a student asked a question: "That bagel looks like water coming from a waterfall," Nico Camargo said. "What if you froze water?"

Cheng was excited by the idea.

"A frozen Mobius strip," she said. "Why didn't I think of that?"

Pictures And Problem-Solving

Camargo grinned. He knew why he was able to come up with the unusual idea. It is because he studies art.

Camargo is a student at the School of the Art Institute of Chicago. The school is known as SAIC, for short.

Cheng teaches math at SAIC.

Most people think art is very different from math and science. SAIC thinks that idea is wrong.

The school has come up with a new class. It shows students how art is related to math and science.

Others schools are also bringing art and math together.

Some teachers think art can help them teach math and science. A picture might help students understand.

Just Like Leonardo

Art and science were not always far apart. In the past, artists could also be scientists.

Leonardo da Vinci is the perfect example. He lived from 1452 to 1519.

Da Vinci is one of the greatest artists who ever lived. He also tried to design a flying machine.

Math Videos And Music

Science and art have been growing apart for 200 years. SAIC wants to bring them closer together again.

Cheng is not just a math teacher. She is also a pianist. Cheng thinks math and music are very close. Music is a kind of art.

Cheng has posted short math videos on YouTube. They have been looked at more than 800,000 times. She has also written a new book on math.

Cheng does not expect SAIC students to learn math perfectly. They do not need to. She just wants them to understand some big ideas. It is the big ideas that make math exciting.

You can enjoy "listening to music even if you can't play it yourself," she said. The same is true of math.

For these students, if you can picture it, you can solve the problem

By Chicago Tribune, adapted by Newsela staff on 04.08.15
Word Count **441**

Eugenia Cheng, a pure mathematician and visiting scientist, speaks to a combined physics and studio class called "Articulating Time and Space" about mathematical concepts at the School of the Art Institute of Chicago, March 18, 2015. Photo: Brian Cassella/Chicago Tribune/TNS

Mathematician Eugenia Cheng had just cut a bagel into a strange twisted shape known as a Mobius strip. She began explaining why a liquid could not possibly take the same shape. Then a student asked a question: "That bagel looks like water coming from a waterfall," Nico Camargo said. "What if you froze water?"

Cheng was delighted by the idea.

"A frozen Mobius strip," she said with excitement. "Why didn't I think of that?"

Get The Picture

A grinning Camargo suggested that he had come up with the unusual idea because he is an art student.

Camargo attends the School of the Art Institute of Chicago (SAIC). His school has begun offering classes that explore the similarities between art and science.

SAIC already had science and math classes, but now the school is offering a new class that connects those subjects to art. It was this class that Cheng was invited to speak to.

Around the country, other schools and museums are also trying to bring art and science closer together. Some teachers feel that art could help them teach math and science. Perhaps pictures might make complicated ideas easier to understand.

From Leonardo To "Jeopardy!"

Art and science were not always as separate as they are today. Through much of history, many artists were also scientists. For example, Leonardo da Vinci was an inventor as well as being one of the most famous artists ever.

Over the past 200 years, science and art have grown far apart. SAIC and other schools feel it is time to start bringing them closer together again. SAIC has begun inviting well-known scientists to spend time at the school. The first scientist they invited was David Gondek. He helped build a supercomputer that beat two champions on the “Jeopardy!” quiz show.

Math And Music

The second scientist the school invited was Cheng. She gives talks to students and the public and also teaches math classes.

Cheng is not just a mathematician. She is also a concert pianist. For her, math and art have many similarities. Both work with things that are only ideas, not objects in the real world.

Teaching at SAIC is just one of the ways Cheng is bringing math to wider audiences. She posted short math videos on YouTube that have been viewed more than 800,000 times.

Cheng does not expect SAIC students to master complicated math. However, she thinks they can still get a sense of some of the ideas that makes math so exciting.

“I always say you can appreciate listening to music even if you can’t play it yourself,” she said. The same is true of math, she feels.

At this Chicago school, art is a bridge to science and math

By Chicago Tribune, adapted by Newsela staff on 04.08.15
Word Count **715**

Eugenia Cheng, a pure mathematician and visiting scientist, speaks to a combined physics and studio class called "Articulating Time and Space" about mathematical concepts at the School of the Art Institute of Chicago, March 18, 2015. Photo: Brian Cassella/Chicago Tribune/TNS

Mathematician Eugenia Cheng had just cut a bagel into the strange one-sided shape known as a Mobius strip. She was explaining why a liquid could not take the same shape, when a student asked a question: "That bagel looks like water coming from a waterfall," Nico Camargo said. "What if you froze water?"

Cheng was delighted by the idea.

"A frozen Mobius strip," she said with excitement. "Why didn't I think of that?"

A grinning Camargo suggested that he had come up with the unusual idea because he is an art school student.

Cool Combo: Art And Physics

Camargo attends the School of the Art Institute of Chicago (SAIC). More and more these days, his school is exploring the connections between art and science.

SAIC already had science and math classes, but the school is now offering a class that connects those subjects to art. Cheng had been invited to speak to a class full of art students.

The new class combines art and physics, a type of science that studies the nature of matter and energy.

The work at SAIC is just one example of a growing interest in combining science and art. The National Endowment for the Arts (NEA) and the National Science Foundation held meetings in 2010 on how artists, scientists and technology experts can work together. The NEA has funded about 30 arts-science and arts-technology projects a year since 2011.

“Artists and scientists are both looking to advance understanding and meaning,” said the NEA's Bill O’Brien.

Looking For The Next Leonardo

The Rhode Island School of Design is another of the nation’s best art schools. These days it is also trying to combine art with science, technology, engineering and mathematics.

At the Museum of Science and Industry, the Art of Science Learning project is developing ways to teach science by using art. The project first brought together scientists, artists, teachers and students in 2014.

In a way, all this is a return to old ways of thinking about science and the arts. The two were not always as separate as they are today. Through much of history, many artists were scientists as well. The combination is perfectly illustrated by Leonardo da Vinci, who was an inventor as well as being one of the most famous artists ever. Only within the last 200 years have science and art grown far apart.

SAIC's new efforts were begun by the school’s president, Walter Massey, who is a physicist.

Massey was eager to explore the connections between science and art. He began holding teacher meetings that looked at the similarities in the ways artists and scientists see the world.

SAIC now has a scientist-in-residence program, through which a well-known scientist spends a period of time at the school. The first scientist was David Gondek, who helped develop a supercomputer that beat two champions on the “Jeopardy!” quiz show. Cheng, who teaches math at the school, is SAIC's second scientist-in-residence.

Music, Math And Edible Pi

Cheng is not only a mathematician, but a concert pianist as well. For her, there is a strong connection between math and art. Both work with things that exist only as ideas, not as objects in the real world.

For Cheng, teaching at SAIC is just one way to bring mathematics to wider audiences. Her short math videos on YouTube have been viewed more than 800,000 times. Her new book, “How to Bake Pi: An Edible Exploration of the Mathematics of Mathematics,” will be published in May.

Cheng does not expect SAIC students to master complicated mathematics. However, she said, they can still get a sense of the kinds of ideas that makes math so exciting for her.

“I always say you can appreciate listening to music even if you can’t play it yourself,” she said. The same is true of math, she feels.

Charles Shields is an art student who is taking Cheng's math class. He finds the ideas intriguing even if he cannot always do the computations, he said.

For one of his projects, Shields made a stained glass work that reads, “1 + 1 equals 1.”

Cheng was startled at first, but in the end, she loved it.

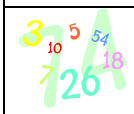
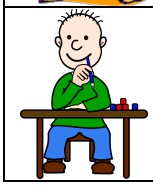
“There are mathematical systems where 1 plus 1 does not equal 2,” she said. “There are some in which it’s zero.”

Name _____

Problem Solving Centers – Student Table

Requirements:
Over the next four weeks, you must do at least one activity from each of the eight centers. Record the date and the activity option chosen in the correct box below.

As you go to each center, think about the following questions:
Why do people invent?
How do inventors solve problems?
What do you do with an idea?

	Week 1	Week 2	Week 3	Week 4
				
				
				
				
				
				
				
				

Musical Problem Solving Center

1. Write an advertising jingle.

2. Make a list of songs that calm, stimulate, or inspire you.

3. Make a musical instrument using the materials provided.

4. Create new lyrics to a pre-existing song/rhyme/rhythm.

5. Add sound effects to a story using instruments/items around the classroom.

Bodily-Kinesthetic Problem Solving Center

1. Explore with pool noodle pieces and toothpicks or play dough. Build. Sculpt. Create.

2. Engineer a new drinking straw and see if it works using straws and cups.

3. Create an obstacle course using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops.

4. Build a working pulley using: cardboard tubes, lids, pencils, cups, strings, spools

5. Build a catapult using: tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power.

Linguistic Problem Solving Center

1. Write a thank you note to an inventor expressing your gratitude for his/her contributions to the world and/or his/her creativity and ability to solve problems.

2. Solve word finds, crossword puzzles, or create your own word puzzle.

3. Create a book/list of fun facts about an inventor.

4. Read Roget's original thesaurus. Compare and contrast it to *Roget's 21st Century Thesaurus*. Create lists like Roget.

5. Write a fantasy about an inventor and his/her creation. Think: Mary Shelley who created *Frankenstein*.

Logical-Mathematical Problem Solving Center

1. Create patterns, designs, and imaginary figures using tangrams or geoboards and geobands.

2. Using clothes pins and playing cards, create a pattern or game.

3. Using the binary alphabet code provided, create words/messages with Legos and a base plate.
   - 1= White 0= Blue
   - https://www.kidscodecs.com/a-binary-numbers-tutorial-with-1-and-0/

4. Explore measurement with the following supplies: tape measure, ruler, wood pieces, pencil

5. Look at the patents. What is similar and different about the patents? What do you find interesting?

Spatial Problem Solving Center

1. Assemble environmental print puzzles using magazines, cardboard food boxes, and junk mail.

2. Create using the torn paper, paint spills, bent paper, coffee stains, holes, crumpled paper. Reference *Beautiful Oops!* by Barney Saltzberg if you need inspiration.

3. Build a Lego maze testing it with a marble.

4. Map an obstacle course onto graph paper using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops

5. Think of a complex way to solve a simple problem. Then create a Rube Goldberg inspired comic. Reference the Rube Goldberg comic book.

Naturalist Problem Solving Center

1. Collect items outside at recess. Create something with your artifacts.

2. Imagine you are in one of the scenic pictures provided. What are you feeling, experiencing, doing?

3. Photograph and print an image from the outdoors. Write a description, caption, and/or poem for your photograph.

4. Using a microscope, explore different slides. What do you see?

5. Brainstorm and record solutions to environmental problems. Example: the problem with trash, how to prevent/clean up oil spills, how to decrease our environmental footprint

Interpersonal Problem Solving Center

1. Create an advertisement for an invention that has helped you. Make sure to show the product and persuade the audience/buyer/customer why they need the invention/product.

2. Play Mouse Trap.
    - View life-sized Mouse Trap: https://www.youtube.com/watch?v=Rdqrdw8qt3Y

3. Build a tic-tac-toe board using Legos and a base plate. Then play tic-tac-toe with a partner.

4. Invent a new game to play with others using cardboard and miscellaneous items from container

5. Create a skit that demonstrates one of the unit vocabulary words: brainstorm, factory, manufacture, production, engineer, patent, device, opportunity, prototype, lawyer. Look up the word in the dictionary to confirm the definition.

Intrapersonal Problem Solving Center

1. Imagine and journal about life without one of your favorite inventions (books, light switch, refrigerator, bicycle, pencil).

2. Read about a topic that interests you.

3. Reflect on a way to solve a problem. Write down your problem and solution.

4. Spend time in quiet thought.

5. Set a goal for a problem you would someday like to solve. Write your goal in your reading response notebook

For Teacher Reference

Musical Problem Solving Center Materials :

1. paper and pencil
2. paper and pencil
3. recyclable materials
4. paper and pencil
5. instruments

Bodily-Kinesthetic Problem Solving Center Materials:

1. pool noodle pieces, toothpicks and play dough
2. straws, straw making kit from dollar store, mini cups
3. 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, 5 hula hoops
4. cardboard tubes, lids, pencils, cups, strings, spools
5. tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power
   Idea from http://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/

Linguistic Problem Solving Center Materials:

1. paper and pencil
2. word finds, crossword puzzles, paper
3. paper and pencil
4. Roget's original and 21st century thesaurus
5. paper and pencil

Logical-Mathematical Problem Solving Center Materials:

1. tangrams, geoboards and geobands
2. clothes pins and decks of cards
3. Binary code sheet, Legos: white, blue, and one additional color, base plate
4. tape measure, rule, wood pieces, pencil
5. printouts of patents

Spatial Problem Solving Center Materials:

1. cut up magazines, food boxes, and junk mail
2. torn paper, paper with paint spills, bent paper, coffee stained paper, paper with holes, crumpled paper
3. Legos, base plate, marble
4. graph paper and pencil
5. Rube Goldberg comic book, paper, pencil, colored pencils

Naturalist Problem Solving Center Materials:

1. bucket to collect artifacts
2. calendar of outdoor scenes
3. camera and printer, paper and pencil
4. microscope and slides
5. paper and pencil

Interpersonal Problem Solving Center Materials:

1. props
2. Mouse Trap game
3. Legos and base plate
4. cardboard and miscellaneous items to serve as game pieces
5. dictionary, props

Intrapersonal Problem Solving Center Materials:

1. journal, reading response notebook and pencil
2. book corner
3. paper and pencil
4. quiet space
5. reading response notebook and pencil

Day 10: Readers Theater

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Five scripts found in Appendix K:
  - George Washington Carver script arranged by Kathy Applebee; 10 roles
  - Margaret E. Knight script arranged by Nicki Stohr; 12 roles
  - Georg Ferris script arranged by Ginny Sain; 11 roles
  - Garrett Morgan script arranged by Nina Mengali; 2 roles
  - Louis Pasteur script by Martha Cheney and Hilve Firek; 10 roles
- Interest Survey

Objective:

- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Bodily-Kinesthetic
- Linguistic
- Interpersonal

Procedure

Whole Group/Independent/Small Group – Readers Theater

<u>Introduce</u>

- Options: Determine readers theater scripts in advance depending on student interest/numbers of students in class.
- Choose roles based on scripts chosen.
- Review what makes for a quality readers theater performance:
  - Reads with expression, proper emphasis, and clear enunciation, using his/her voice effectively to convey meaning.
  - Projects to the audience.
  - Is familiar with the part and is able to read it with fluency.
- Inform each group they need to be able to answer the following questions upon completion of their performance:
  - Why did your inventor invent?
  - How did your inventor solve a problem?

<u>Practice</u>

- Students will highlight and read through their lines independently.

- They will gather in a circle with their group and practice their lines in order.
- Students will stand in a line while they practice, serving as a dress rehearsal.

Perform

- Gather students together.
- Review what a good audience looks and sounds like: They listen to and look at the performers, think about what the readers are saying, sit quietly.
- Perform.
- Ask questions and give positive feedback after each performance.
- Discuss how the inventors were similar and different.

Independent - Respond in reading response notebook or using attached ½ sheets

Name of inventor _____

- Why did your inventor invent?
- How did your inventor solve a problem?

Independent – Interest Survey

- Students will fill out a survey to determine small groups for next week.

Assessment

- Readers Theater Reading Response

Name _____

Readers Theater Reading Response

Name of inventor _____

Why did your inventor invent? _____

_____

_____

_____

How did your inventor solve a problem? _____

_____

_____

_____

Name _____

Readers Theater Reading Response

Name of inventor _____

Why did your inventor invent? _____

_____

_____

_____

How did your inventor solve a problem? _____

_____

_____

_____

Name _____

Interest Survey

Next week, we will be reading about inventions from different cultures.
Check your top three choices.

Inuit inventions	
African inventions	
Chinese inventions	
Arab World inventions	
Native American inventions	

Name _____

Interest Survey

Next week, we will be reading about inventions from different cultures.
Check your top three choices.

Inuit inventions	
African inventions	
Chinese inventions	
Arab World inventions	
Native American inventions	

Name _____

Interest Survey

Next week, we will be reading about inventions from different cultures.
Check your top three choices.

Inuit inventions	
African inventions	
Chinese inventions	
Arab World inventions	
Native American inventions	

Day 11: Vocabulary and Independent Reading

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Vocabulary list for *Snowflake Bentley* by Jacqueline Briggs Martin
- Visual Vocabulary student form
- Independent Reading timeline/map
- Independent Reading nonfiction bookmark
- Independent Reading Conference Form-Biography

Objectives:

- Determine the meaning of general academic and domain-specific words or phrase in a text relevant to a grade 4 topic or subject area. CCSS 4.2.4.4
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Linguistic
- Spatial
- Naturalist
- Intrapersonal

Procedure

Whole Group/Independent – Vocabulary

- Show the vocabulary list for *Snowflake Bentley* by Jacqueline Briggs Martin.
- To better understand the vocabulary, students will make visuals of words that are more challenging for them to understand. They can reference *Snowflake Bentley,* dictionary, thesaurus, etc. to help them gather meaning.
- The visuals will be used tomorrow before reading *Snowflake Bentley.*
- Students can read their inventor biography independently once they are finished with their vocabulary visuals.

Independent – Read inventor biography

- They will read their inventor biography/biographies (if picture books).
- As they read, they can use the nonfiction reader bookmark they received at the beginning of the school year to stop, think, and jot as they read.
- Students should take out their map/timeline of what they needed to accomplish this week.
- They can reference their R.A.F.T. Project Options and Rubric if they need direction on the next step in the process.

Independent reading conferences

- Check in with students using the Independent Reading Conference Form-

Biography
Assessment
• Visual Vocabulary • Independent reading conferences

Snowflake Bentley by Jacqueline Briggs Martin Vocabulary

Concrete vocabulary	More complex/abstract vocabulary
Pages 1, 23- **lantern**- a lamp you carry with a clear outside to protect the flame Page 2- **snowbelt-** an area of land that has lots of snow (more than areas around it) Page 4- **net**- to catch something with a net Page 5- **encyclopedias**- a set of reference books that have information on many subjects Page 14- **lens-** a piece of glass through which light passes to create a photo Page 15- **etching-** cutting or carving a design Page 18- **quantities**- amounts Page 19- **dozen-** twelve Page 20- **dew-covered-** a cold surface with tiny drops of water on it Page 24- **published-** printed Page 24- **scholars-** people who study specific topics Page 24- **expert-** a person who knows a lot about a topic Page 28- **plaque-** a special sign often used to remember a person or event Page 28- **monument-** a statute or building to remember a person or event Page 28- **delicate-** easily broken, fragile Page 28- **authority-** a person who knows a lot about a topic and makes decisions about that topic Page 28- **technique-** a way of doing something Page 28- **reveal-** to show Page 28- **hexagonal-** a 6 sided closed shape Page 28- **infinite-** an endless amount	Pages 6, 10, 12- **microscope**- an instrument that makes very small objects look much larger; an instrument that magnifies an object Pages 6, 8 – 9, 15, 18 – 19, 22, 24, 28- **crystals**- a small piece of ice that has many sides Pages 7, 14- **experiment**- taking steps to make a discovery or explore a subject Pages 7, 18- **moisture**- small amount of liquid (like water) that makes something wet Pages 8, 28- **designs**- the way items are placed or arranged; the way they look Pages 8, 18- **branches** - an offshoot of a main part; one of the 3 or 6 offshoots from the center of a snowflake Page 10, 14 – 16, 19, 23 – 25- **photograph(s)-** an image or picture made using a camera Page 12- **magnify** - to make something look larger than it is Page 23- **inspire-** to help someone want to do something Vocabulary words fo*r Snowflake Bentley* found in the form of a pdf on the Anchorage, AK School District website

Name _____

***Snowflake Bentley* by Jacqueline Briggs Martin Visual Vocabulary**

- Choose four words from the vocabulary list that are more difficult for you to understand.
- Read the definition.
- Make sketches, find synonyms/antonyms, read in context, etc. to help you remember the meaning of each word.

word:	word:
word:	word:

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Nonfiction readers stop when we…			
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Burst with curiosity	I wonder…?	How come…?	Why did…?
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Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Name _____

Independent Reading Project– Biography

Use this form to map out your reading over the next two weeks.

Ideas:

- Write out how many pages and chapters you should read in a day/week.
- If you are reading multiple biographies about your inventor, write when you would like to read each book.
- Some reading may need done at home.

Name of Inventor _____

Book Title(s) _____

_____

_____

Week 1	Week 2
Monday: 30 minutes in class	Monday: 30 minutes in class
Tuesday: 30 minutes in class	Tuesday:
Wednesday:	Wednesday:
Thursday:	Thursday:
Friday:	Friday: 45 minutes in class

Name _____

Independent Reading Conference Form – Biography

Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:
Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:

Potential teacher questions (to dig deeper):

- *What challenges did this person face? How did he/she work to overcome these challenges?*
- *Describe a difficult decision the person had to make. Do you think you would have made the same choice? Why?*
- *What do most people think is this person's most significant accomplishment? Do you think the person would agree that this was the most important thing he/she did? Why or why not?*
- *Why would an author write a biography about this individual?*
- *From what you have read so far, tell about an event that was very influential on the choices the person made in his/her life.*
- *What do you admire about the person in this biography? Why? How might you become more like this person?*
- *What do you think school was like for the person about whom this biography was written? Explain.*

Day 12: *Snowflake Bentley*

Grade Level: 4

Essential Questions:

- Why did Wilson Bentley invent?
- How did Snowflake Bentley solve a problem?
- What do you do with an idea?

Materials:

- Student vocabulary visuals
- Book: *Snowflake Bentley* by Jacqueline Briggs Martin illustrated by Mary Azarian
- Read with a Question in Mind Think Sheet and anchor chart
- Book *Snowflakes in Photographs* by W.A. Bentley
- Short film (8:33) on Snowflake Bentley https://www.youtube.com/watch?v=ptLmA263hlk
- Venn Diagram

Objectives:

- Read with a question in mind.
- Determine the meaning of general academic and domain-specific words or phrase in a text relevant to a grade 4 topic or subject area. CCSS 4.2.4.4
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3
- Compare and contrast a firsthand and secondhand account, of the same event or topic; describe the differences in focus and the information provided 4.2.6.6

Multiple Intelligences:

- Linguistic
- Spatial
- Naturalist
- Interpersonal

Procedure

Whole Group – Read aloud

Introduction

- Show some vocabulary visuals from yesterday's lesson.
- Show *Snowflakes in Photographs* by W.A. Bentley.
- Ask: What do you see? How do the snowflakes make you feel?

Practice

- Read with a question in mind.
  - Why did Wilson Bentley invent?
- Model: From p. 123 Harvey and Daniels

- Explain that reading with a question in mind is very helpful strategy to get exactly the information we need. It's easy to lose your way and take notes on everything without a question.
- Keeping your question in mind as you read will help you notice the information that answers your question while screening out less information.
- At the top of the form, write the question and then show how to read with the question in mind.
- Notes column is for factual information that relates to the question and Thinking column is for reactions, connections, and inferences.

- Read a few pages aloud in *Snowflake Bentley*: stop, and jot down information in the columns.
- Add student ideas to anchor chart.

Closure

- Turn and Talk: Why did Wilson Bentley invent?

Whole Group/Partners – Compare and contrast

- Students will watch a short film (8:33) about Snowflake Bentley. https://www.youtube.com/watch?v=ptLmA263hlk
- In partners, they will complete a Venn Diagram– comparing and contrasting the film to the book *Snowflake Bentley*. Students will have had previous exposure to a Venn Diagram so they will not need direct instruction on how to complete it.

Independent –Read inventor biography

- If time permits, allow students to read their inventor biographies independently.

Assessment

- Venn Diagram

Additional Resources

The Snowflake Man
https://www.youtube.com/watch?v=ptLmA263hlk
Snowflake Bentley website
http://www.snowflakebentley.com
Web quest resource
http://trackstar.4teachers.org/trackstar/ts/viewTrackMembersText.do;jsessionid=F94283B14340A3C825ABC2C94A329DBC?number=158976&password=
Snowflake templates to cut
http://www.firstpalette.com/tool_box/printables/snowflake.html

Name _____

Read with a Question in Mind Think Sheet Example

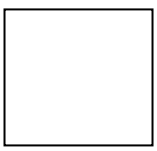
Question: Why did Wilson Bentley invent?

Notes	Thinking
• Wilson Bentley was born and lived on a farm in Jericho, in the 'snowbelt'. • He watched snowflakes fall on his mittens. • He said snow was as beautiful as butterflies or apple blossoms.	• I can infer Wilson is observant and loves snow. • I like the use of a simile to compare snow to other parts of nature.

Self-Reflection: Color the box using the descriptions below.

- I can read with a question in mind.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Read with a Question in Mind Think Sheet

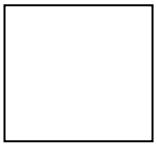
Question: _____

Notes	Thinking

Self-Reflection: Color the box using the descriptions below.

- I can read with a question in mind.

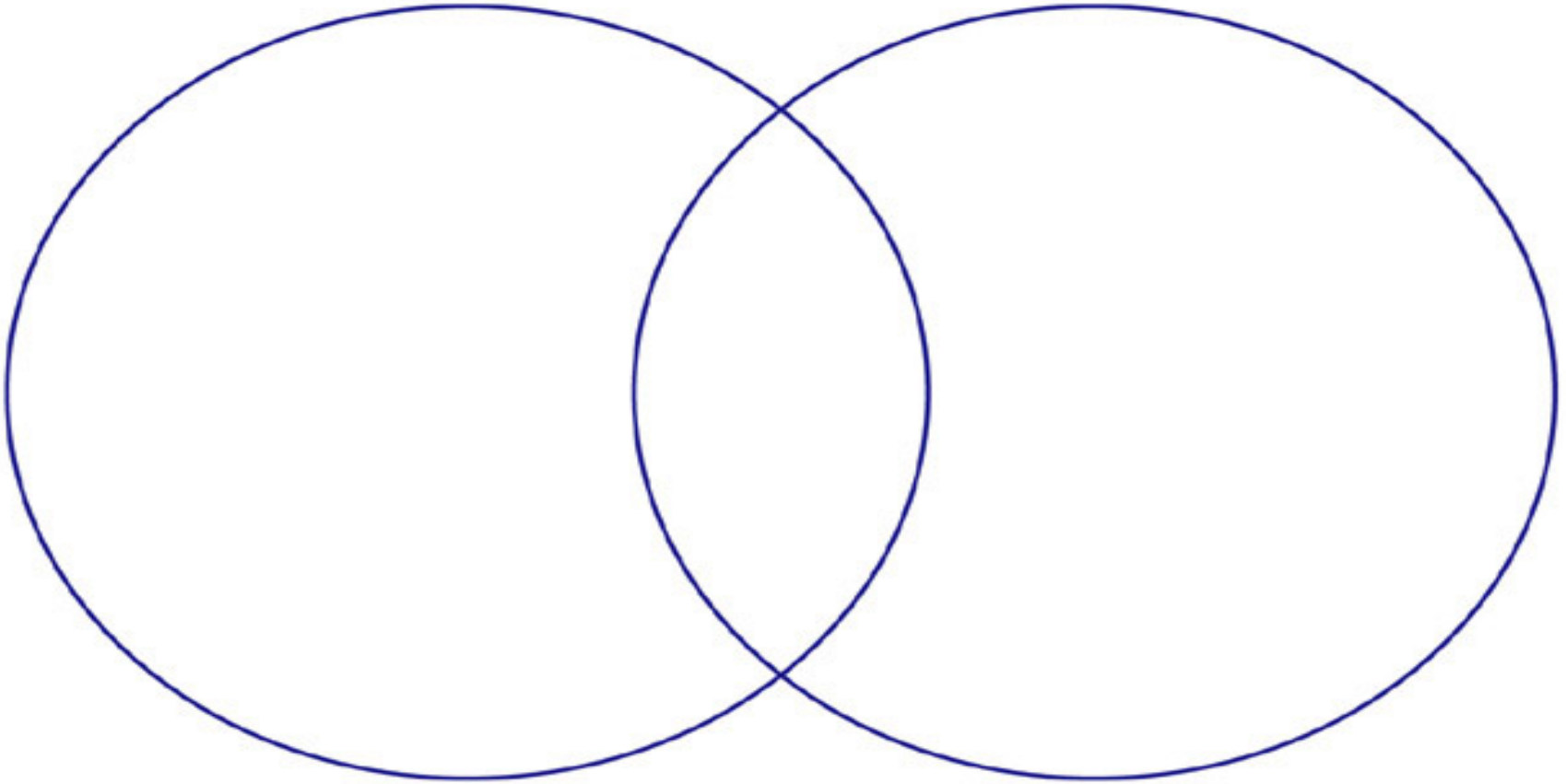
  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Compare and Contrast Venn Diagram

- Discuss and record the similarities among and differences between the book *Snowflake Bentley* and the film about Snowflake Bentley.
- Label each section.
- List at least 2 details in each section.



Days 13 and 14: Problem Solving Centers and Nonfiction Text Features in Small Group

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Problem Solving Centers – Student Table
- Problem Solving Center Options
- Use Text and Visual Features to Gain Information Think Sheet
- Books:
  - *A Native American Thought of It* by Rocky Landon with David MacDonald
  - *The Inuit Thought of It* by Alootook Ipellie with David MacDonald
  - *Africans Thought of It* by Bathseba Opini and Richard B. Lee
  - *The Chinese Thought of It* by Ting-xing Ye
  - *The Arab World Thought of It* by Saima S. Hussain

Objectives:

- Use a variety of ways to synthesize information and share their learning.
- Use text and visual features to gain information.
- Interpret information visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. CCSS 4.2.7.7

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – Review Problem Solving Centers; if necessary

- Behavior expectations:
  - Follow classroom expectations established as a class at the beginning of the school year.
  - Students may choose where to start each day as long as they participate in one activity within each Problem Solving Center by the end of the unit.
  - Remind students that whatever materials they take out need to be returned to the correct Problem Solving Center when they are done with each activity.

Independent – Problem Solving Centers

Small Group – Use Text and Visual Features to Gain Information

- Over the next two days, meet with students based on interest.

- Each student in the group will have a different book based on the Interest Survey from Day 10.

Introduce From Harvey and Daniels p. 119

- Explain that nonfiction has two distinct types of features – visual and text. We need to pay attention to both types when reading.
- Have students flip through the texts and point out which features are visual and which are text.

Practice

- Co-construct a feature/purpose think chart: turn to a page and model how to make sense of a map, photograph, caption, table of contents, timeline, etc.
- Provide time for students to read and record some information they learned from the text and visuals.

Close

- Share one piece of information they learned/gained from using text and visual features.

Assessment

- Use Text and Visual Features to Gain Information Think Sheet
- Problem Solving Centers – Student Table

Name _____

Use Text and Visual Features to Gain Information Think Sheet Example

Book Title _____

Feature	**Purpose**
table of contents	locate pages of specific information
photograph	to show something
caption	to tell about the photo
map	know where people/things are located in the world
timeline	understand important events in chronological/time order
headings	identify topics
index	quickly find pages that contain information you are looking for

Using the text and visual features, write down something you learned from your book.

_____

_____

_____

_____

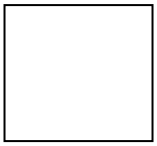
_____

_____

Self-Reflection: Color the box using the descriptions below.

- I can use text features to gain information.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Use Text and Visual Features to Gain Information Think Sheet

Book Title _____

Feature	**Purpose**

Using the text and visual features, write down something you learned from your book.

_____

_____

_____

_____

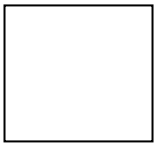
_____

_____

Self-Reflection: Color the box using the descriptions below.

- I can use text features to gain information.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Day 15: Review Independent Reading Project and Read Independently

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Independent Reading nonfiction bookmark
- Independent Reading timeline/map
- R.A.F.T. Project Options and Rubric
- Independent Reading Conference Form-Biography
- Unit Think Sheets

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Linguistic
- Intrapersonal

Procedure

Whole Group – Review Independent Reading Project

- Review independent reading project.
  - Students will finish reading their inventor biography/biographies (if picture books) by Monday.
  - As they read, they can use the nonfiction reader bookmark they received at the beginning of the school year to stop, think, and jot as they read.
  - Students should check in with how they are coming along with the break down of their reading.
- Review R.A.F.T. Project Options, Rubric, work time, and due date.
- Today is the last day to read in class. Offer Think Sheets to students who want to/need to focus their reading.

Independent – Read inventor biography

Independent reading conferences

- Check in with students using the Independent Reading Conference Form-Biography

Assignment

- Finish reading biography/biographies by Monday.
- Bring materials to work on Monday, Tuesday, and Thursday next week.

Assessment

- Independent reading conferences

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Nonfiction readers stop when we…			
Learn new information	I just learned… This makes me think…	This part teaches me… The examples given are…	I didn't know… This makes me realize…
Burst with curiosity	I wonder…?	How come…?	Why did…?
Encounter new words	From the picture, I think _____ means…	From the text, I think _____ means…	My best guess is…
Come to the end of section/chapter	This part is mostly about…(who, what, why, where, when, and how)	From reading this, I could teach…	Main Idea • detail • detail • detail

Name _____

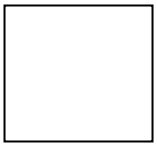
Important to Me/Important to the Author Think Sheet

Important to Me	Important to the Author

Self-Reflection: Color the box using the descriptions below.

- I can determine the difference between what I think is most important and the writer's big ideas.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Word/Inferred Meaning/Clues/Sentence Think Sheet

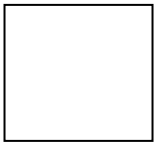
As you read, jot down unfamiliar words and use the context to infer the meaning.

Word	Inferred Meaning	Clues (picture/reading on/capital letters)	Sentence

Self-Reflection: Color the box using the descriptions below.

- I can determine the meaning of general academic and domain-specific words or phrases in a text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

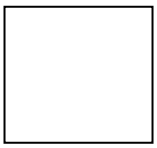
BK + TC = I (Background Knowledge + Text Clues = Inference) Think Sheet

BK	+	TC	=	I
	+		=	
	+		=	
	+		=	

Self-Reflection: Color the box using the descriptions below.

- I can refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

FQR: Facts/Questions/Response Think Sheet

Title _____

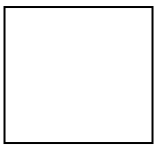
Author _____

Facts	Questions	Response

Self-Reflection: Color the box using the descriptions below.

- I can determine importance, ask questions, and respond to nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Main Idea and Details Think Sheet

Main Idea: What the text is mostly about or the big idea the author wants you to understand (can be topic sentence or concluding sentences in a paragraph)

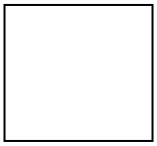
Details: Facts and examples that help support the main idea

Main Idea:
Detail 1:
Detail 2:
Detail 3:

Self-Reflection: Color the box using the descriptions below.

- I can determine the main idea and details in nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Read with a Question in Mind Think Sheet

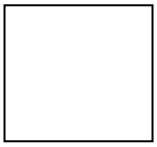
Question: _____

Notes	Thinking

Self-Reflection: Color the box using the descriptions below.

- I can read with a question in mind.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Use Text and Visual Features to Gain Information Think Sheet

Book Title _____

Feature	**Purpose**

Using the text and visual features, write down something you learned from your book.

_____

_____

_____

_____

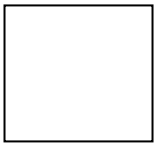
_____

_____

Self-Reflection: Color the box using the descriptions below.

- I can use text features to gain information.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Independent Reading Project– Biography

Use this form to map out your reading over the next two weeks.

Ideas:

- Write out how many pages and chapters you should read in a day/week.
- If you are reading multiple biographies about your inventor, write when you would like to read each book.
- Some reading may need done at home.

Name of Inventor _____

Book Title(s) _____

_____

_____

Week 1	Week 2
Monday: 30 minutes in class	Monday: 30 minutes in class
Tuesday: 30 minutes in class	Tuesday:
Wednesday:	Wednesday:
Thursday:	Thursday:
Friday:	Friday: 45 minutes in class

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
Researcher 	Fourth grade students	Timeline	Create a timeline of 10 important life events (dates and descriptions), along with at least five pictures.
Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

Name _____

Independent Reading Conference Form – Biography

Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:
Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:

Potential teacher questions (to dig deeper):

- *What challenges did this person face? How did he/she work to overcome these challenges?*
- *Describe a difficult decision the person had to make. Do you think you would have made the same choice? Why?*
- *What do most people think is this person's most significant accomplishment? Do you think the person would agree that this was the most important thing he/she did? Why or why not?*
- *Why would an author write a biography about this individual?*
- *From what you have read so far, tell about an event that was very influential on the choices the person made in his/her life.*
- *What do you admire about the person in this biography? Why? How might you become more like this person?*
- *What do you think school was like for the person about whom this biography was written? Explain.*

Day 16: *The Most Magnificent Thing* and R.A.F.T. Project Work Time

Grade Level: 4

Essential Questions:
- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:
- Book: *The Most Magnificent Thing* by Ashley Spires
- R.A.F.T. Project Options and Rubric
- Access to computers with internet

Objectives:
- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:
- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – Read aloud and Review Independent Reading Project
- Read *The Most Magnificent Thing*.
  - Discuss the message and how it relates to the essential questions and their independent reading project.
  - Persevere, trial/error, problem solve
- Review R.A.F.T. Project Options and Rubric.
  - Review expectations so that all students can work thoughtfully and productively the rest of class.

Independent – R.A.F.T. Project work time
- Clarify questions, ask questions to guide students, assist students who need help.

Assignment
- Bring materials to work tomorrow and Thursday.

Assessment
- R.A.F.T. Project Rubric

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
Researcher 	Fourth grade students	Timeline	Create a timeline of 10 important life events (dates and descriptions), along with at least five pictures.
Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

Day 17: R.A.F.T. Project Work Time

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- R.A.F.T. Project Options and Rubric
- Access to computers with internet

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – Review Independent Reading Project

- Review R.A.F.T. Project Options and Rubric; if necessary.
    - Review expectations so that all students can work thoughtfully and productively the rest of class.

Independent – R.A.F.T. Project work time

- Clarify questions, ask questions to guide students, assist students who need help.

Assignment

- Bring materials to work Thursday.

Assessment

- R.A.F.T. Project Rubric

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
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Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

Day 18: *The Dot* and Problem Solving Centers

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Problem Solving Centers – Student Table
- Problem Solving Center options
- See specific Problem Solving Centers for list of materials
- Book: T*he Dot* by Peter H. Reynolds
- Problem Solving Centers – Reflection

Objective:

- Use a variety of ways to synthesize information and share their learning.

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group - Last Day of Problem Solving Centers

- Inform students that it is the last day to complete at least one activity from each of the eight centers.
- Behavior expectations:
  - Follow classroom expectations established as a class at the beginning of the school year.
  - Remind students that whatever materials they take out need to be returned to the correct Problem Solving Center when they are done with each activity.

Independent/Small Group – Problem Solving Centers

- While students explore and complete the Problem Solving Centers, walk around the room taking anecdotal notes.
- Give a five-minute warning signal so students have time to complete at least one activity from each of the intelligences.

Close – Read aloud and Reflection

- Read aloud *The Dot* by Peter H. Reynolds.
  - Discuss the message.
  - Provide time for students to share how they plan to make their mark.
- Reflect on the Problem Solving Centers

- What centers were harder/easier than you thought? Why?
- What did you like? didn't you like?
- What was your favorite/least favorite Problem Solving Center? Why?

- Complete the reflection providing specific examples from doing the Problem Solving Centers.
  - Why do people invent?
  - How do inventors solve problems?
  - What do you do with an idea?

Assignment

- Bring R.A.F.T. Project materials tomorrow.

Assessment

- Problem Solving Centers – Student Table
- Problem Solving Centers – Reflection

Name _____

Problem Solving Centers – Reflection

Look at your Problem Solving Centers table and draw a symbol to mark your thinking.

	your favorite center
	the center that made you think like an inventor
	the most challenging center for you

- Respond to the following questions using what you learned from the Problem Solving Centers.
- Write your thinking/answers in complete sentences.

Why do people invent?
Give a specific example from your experience doing a Problem Solving Center.

_____

_____

_____

_____

_____

How do inventors solve problems?
Give a specific example from your experience doing a Problem Solving Center.

_____

_____

_____

_____

_____

_____

What do you do with an idea?
Give a specific example from your experience doing a Problem Solving Center.

Problem Solving Centers - Anecdotal Notes

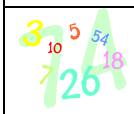
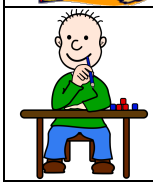
	Week 4 Observations
List student names here	

Name _____

Problem Solving Centers – Student Table

Requirements:
Over the next four weeks, you must do at least one activity from each of the eight centers. Record the date and the activity option chosen in the correct box below.

As you go to each center, think about the following questions:
Why do people invent?
How do inventors solve problems?
What do you do with an idea?

	Week 1	Week 2	Week 3	Week 4
				
				
				
				
				
				
				
				

Musical Problem Solving Center

1. Write an advertising jingle.

2. Make a list of songs that calm, stimulate, or inspire you.

3. Make a musical instrument using the materials provided.

4. Create new lyrics to a pre-existing song/rhyme/rhythm.

5. Add sound effects to a story using instruments/items around the classroom.

Bodily-Kinesthetic Problem Solving Center

1. Explore with pool noodle pieces and toothpicks or play dough. Build. Sculpt. Create.

2. Engineer a new drinking straw and see if it works using straws and cups.

3. Create an obstacle course using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops.

4. Build a working pulley using: cardboard tubes, lids, pencils, cups, strings, spools

5. Build a catapult using: tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power.

Linguistic Problem Solving Center

1. Write a thank you note to an inventor expressing your gratitude for his/her contributions to the world and/or his/her creativity and ability to solve problems.

2. Solve word finds, crossword puzzles, or create your own word puzzle.

3. Create a book/list of fun facts about an inventor.

4. Read Roget's original thesaurus. Compare and contrast it to *Roget's 21st Century Thesaurus*. Create lists like Roget.

5. Write a fantasy about an inventor and his/her creation. Think: Mary Shelley who created *Frankenstein*.

Logical-Mathematical Problem Solving Center

1. Create patterns, designs, and imaginary figures using tangrams or geoboards and geobands.

2. Using clothes pins and playing cards, create a pattern or game.

3. Using the binary alphabet code provided, create words/messages with Legos and a base plate.
   - 1= White 0= Blue
   - https://www.kidscodecs.com/a-binary-numbers-tutorial-with-1-and-0/

4. Explore measurement with the following supplies: tape measure, ruler, wood pieces, pencil

5. Look at the patents. What is similar and different about the patents? What do you find interesting?

Spatial Problem Solving Center

1. Assemble environmental print puzzles using magazines, cardboard food boxes, and junk mail.

2. Create using the torn paper, paint spills, bent paper, coffee stains, holes, crumpled paper. Reference *Beautiful Oops!* by Barney Saltzberg if you need inspiration.

3. Build a Lego maze testing it with a marble.

4. Map an obstacle course onto graph paper using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops

5. Think of a complex way to solve a simple problem. Then create a Rube Goldberg inspired comic. Reference the Rube Goldberg comic book.

Naturalist Problem Solving Center

1. Collect items outside at recess. Create something with your artifacts.

2. Imagine you are in one of the scenic pictures provided. What are you feeling, experiencing, doing?

3. Photograph and print an image from the outdoors. Write a description, caption, and/or poem for your photograph.

4. Using a microscope, explore different slides. What do you see?

5. Brainstorm and record solutions to environmental problems. Example: the problem with trash, how to prevent/clean up oil spills, how to decrease our environmental footprint

Interpersonal Problem Solving Center

1. Create an advertisement for an invention that has helped you. Make sure to show the product and persuade the audience/buyer/customer why they need the invention/product.

2. Play Mouse Trap.
    - View life-sized Mouse Trap: https://www.youtube.com/watch?v=Rdqrdw8qt3Y

3. Build a tic-tac-toe board using Legos and a base plate. Then play tic-tac-toe with a partner.

4. Invent a new game to play with others using cardboard and miscellaneous items from container

5. Create a skit that demonstrates one of the unit vocabulary words: brainstorm, factory, manufacture, production, engineer, patent, device, opportunity, prototype, lawyer. Look up the word in the dictionary to confirm the definition.

Intrapersonal Problem Solving Center

1. Imagine and journal about life without one of your favorite inventions (books, light switch, refrigerator, bicycle, pencil).

2. Read about a topic that interests you.

3. Reflect on a way to solve a problem. Write down your problem and solution.

4. Spend time in quiet thought.

5. Set a goal for a problem you would someday like to solve. Write your goal in your reading response notebook

For Teacher Reference

Musical Problem Solving Center Materials :

1. paper and pencil
2. paper and pencil
3. recyclable materials
4. paper and pencil
5. instruments

Bodily-Kinesthetic Problem Solving Center Materials:

1. pool noodle pieces, toothpicks and play dough
2. straws, straw making kit from dollar store, mini cups
3. 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, 5 hula hoops
4. cardboard tubes, lids, pencils, cups, strings, spools
5. tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power
   Idea from http://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/

Linguistic Problem Solving Center Materials:

1. paper and pencil
2. word finds, crossword puzzles, paper
3. paper and pencil
4. Roget's original and 21st century thesaurus
5. paper and pencil

Logical-Mathematical Problem Solving Center Materials:

1. tangrams, geoboards and geobands
2. clothes pins and decks of cards
3. Binary code sheet, Legos: white, blue, and one additional color, base plate
4. tape measure, rule, wood pieces, pencil
5. printouts of patents

Spatial Problem Solving Center Materials:

1. cut up magazines, food boxes, and junk mail
2. torn paper, paper with paint spills, bent paper, coffee stained paper, paper with holes, crumpled paper
3. Legos, base plate, marble
4. graph paper and pencil
5. Rube Goldberg comic book, paper, pencil, colored pencils

Naturalist Problem Solving Center Materials:

1. bucket to collect artifacts
2. calendar of outdoor scenes
3. camera and printer, paper and pencil
4. microscope and slides
5. paper and pencil

Interpersonal Problem Solving Center Materials:

1. props
2. Mouse Trap game
3. Legos and base plate
4. cardboard and miscellaneous items to serve as game pieces
5. dictionary, props

Intrapersonal Problem Solving Center Materials:

1. journal, reading response notebook and pencil
2. book corner
3. paper and pencil
4. quiet space
5. reading response notebook and pencil

Day 19: R.A.F.T. Project Work Time

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- Know vs. No?
- R.A.F.T. Project Options and Rubric
- Access to computers with internet

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Independent/Partner – Revisit Know vs. No?

- Project Know vs. No? on the interactive white board.
- Return Know vs. No? forms filled out on Day 2.
- Having completed the unit, students should complete Know vs. No? in a different color to reevaluate their understanding of the unit's vocabulary words.
- Read aloud the words so that students know how to pronounce them so decoding does not interfere with their knowledge of the word.
- If students can use the word in a sentence, they can do so at the bottom of the page.
- Once all students have finished, they can pair up and discuss how their choices may have changed from the start of the unit to now.

Whole Group – Review Independent Reading Project

- Review R.A.F.T. Project Options and Rubric; if necessary.
  - Review expectations so that all students can work thoughtfully and productively the rest of class.

Independent – R.A.F.T. work time

• Clarify questions, ask questions to guide students, assist students who need help.
Assignment • R.A.F.T. Project due tomorrow.
Assessment
• R.A.F.T. Project Rubric

Name _____

Know vs. No?

- How well do you know these words?
- Mark each word to show your understanding.
- Discuss your choices with a partner.

Word	Don't know it at all	Have seen it or heard it	Have a guess about its meaning	Can use in a sentence	Am an expert on this word
inventor					
brainstorm					
opportunity					
engineer					
device					
factory					
manufacture					
prototype					
patent					
lawyer					

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R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
Researcher 	Fourth grade students	Timeline	Create a timeline of 10 important life events (dates and descriptions), along with at least five pictures.
Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

Day 20: R.A.F.T. Project Presentations

Grade Level: 4

Essential Questions:

- Why do people invent?
- How do inventors solve problems?
- What do you do with an idea?

Materials:

- R.A.F.T. Project Rubric
- "What do you do with an idea?" web from Day 1
- sticky notes

Objectives:

- Determine importance, ask questions, and respond to nonfiction text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information. CCSS 4.2.3.3
- By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band independently and proficiently, with scaffolding as needed a the high end of the range. CCSS 4.2.10.10
    - Self-select texts for personal enjoyment, interest, and academic tasks.

Multiple Intelligences:

- Musical
- Bodily-Kinesthetic
- Linguistic
- Logical-Mathematical
- Spatial
- Naturalist
- Interpersonal
- Intrapersonal

Procedure

Whole Group – R.A.F.T. presentations

- Review R.A.F.T. Project Rubric
- Go over audience expectations.
- Present R.A.F.T. Projects

Conclude Unit

- Show “What do you do with an idea?” web from Day 1.
- Give each student a sticky note. Ask the question again: What do you do with an idea? Provide time to think about what they learned from the unit.
  - Problem Solving Centers
  - Read alouds
  - Inventor Biographies
  - Self-Portraits
  - Readers Theater
  - Small group work
  - R.A.F.T. Project
- Add ideas to pre-existing web and discuss.
- Looking at self-portraits from Day 1, conclude with: What will you do with the ideas inside your head? Think only.

Assessment

- R.A.F.T. Project Rubric

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
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R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

APPENDIX C

Book List for Day 2

The Lexile® Framework for Reading
Matching readers with texts

Inventor Biographies

Alexander Graham Bell: Inventor and ...

1110L

by: Haven, Kendall F.
Alexander Graham Bell may be best known for the telephone, but there was more to him ...

Pages: 128 **ISBN13:** 9780531123140

The Wright Brothers: Inventors of ...

1130L

by: Ryan, Bernard
The Wright Brothers were an amazing team who created one of the most revolutionary inventions of ...

Pages: 128 **ISBN13:** 9780531122549

Alfred Nobel

980L

by: Binns, Tristan Boyer
Bom in Stockholm, Sweden, Alfred Nobel is widely known as the founder of the Nobel Prizes. ...

Pages: 111 **ISBN13:** 9780531123287

Thomas Edison: Inventor of the ...

1110L

by: Tagliaferro, Linda
Thomas Edison, one of the world's greatest inventors, complied an unprecedented, 1,093 patents during his eighty-four-year ...

Pages: 128 **ISBN13:** 9780822546894

Marie Curie

690L

by: Waxman, Laura Hamilton
A biography of the woman scientist from Poland who discovered the element radium which helps to ...

Pages: 48 **ISBN13:** 9780822503002

George Eastman

680L

by: Aller, Susan Bivin
- Timeline - Bibliography - Table of Contents - Glossary - Index - Further List - ...

Pages: 48 **ISBN13:** 9780822502005

American Women Inventors

1030L

by: Camp, Carole Ann
In American Women Inventors, author Carole Ann Camp explores the lives, challenges, and discoveries of some ...

Pages: 104 **ISBN13:** 9780766019133

Pasteur's Fight Against Microbes

690L

by: Birch, Beverley; Birmingham, Christian
n 1856, when Louis Pasteur first began studying microbes in rotten sugarbeet juice, he put into ...

Pages: 48 **ISBN13:** 9780812097931

Milton Hershey: Chocolate King, Town ...

760L

by: Simon, Charnan
With engaging text and historical photographs and illustrations, each of these biographies tells of a well-known ...

Pages: 48 **ISBN13:** 9780516203898 **Ages:** 5 to 11

Thomas Edison: Young Inventor

620L

by: Guthridge, Sue
For use in schools and libraries only. A biography focusing on the childhood of the inventor ...

Pages: 192 **ISBN13:** 9780020418504

African-American Inventors III: Patricia Bath, ...

760L

by: Henderson, Susan K.
Provides biographical profiles of five African American inventors including Patricia Bath, Philip Emeagwali, Henry Sampson, Valerie ...

Pages: 48 **ISBN13:** 9781560656982 **Ages:** 5 to 11

Click!: A Story about George ...

770L

by: Mitchell, Barbara
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 64 **ISBN13:** 9780876142899

Fine Print: A Story about ...

880L

by: Burch, Joann Johansen
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 64 **ISBN13:** 9780876146828

Louis Braille: The Boy Who ...

510L

by: Davidson, Margaret
Blinded at the age of 3, Louis Braille developed a superb memory that enabled him to ...

Pages: 80 **ISBN13:** 9780590443500

The Real McCoy: The Life ...

NC920L

by: Towle, Wendy
Handsome oil paintings enliven this picture book biography about the little-known inventor who inspired the phrase ...

Pages: 32 **ISBN13:** 9780590481021

The Story of Thomas Alva ...

410L

by: Davidson, Margaret
Pages: 64 **ISBN13:** 9780590424035

860L

African-American Inventors

by: St. John, Jetty
Provides biographical profiles of five African American inventors including Lonnie Johnson, Frederick McKinley Jones, Marjorie Stewart ...

Pages: 48 **ISBN13:** 9781560653615

890L

Women Inventors: Margaret Knight, Cynthia ...

by: Blashfield, Jean F.
Presents biographies of women and their inventions, including Ruth Handler and her invention of the Barbie ...

Pages: 48 **ISBN13:** 9781560652748

1030L

John Logie Baird

by: Reid, Struan
The ground-breaking inventor of television is featured in this biography that tells of his poor health ...

Pages: 48 **ISBN13:** 9781575723723 **Ages:** 10 to 13

1190L

Louis Pasteur

by: Fullick, Ann
As well as covering Pasteur's life, this book tells of the impact of his discoveries on ...

Pages: 48 **ISBN13:** 9781575723730 **Ages:** 10 to 13

1030L

Alexander Graham Bell

by: Reid, Struan
A biography of the prolific inventor best known for his work with the deaf and his ...

Pages: 48 **ISBN13:** 9781575723662 **Ages:** 10 to 13

630L

Marie Curie: Brave Scientist

by: Brandt, Keith
A brief biography focusing on the youth of the scientist who twice received the Nobel Prize ...

Pages: 48 **ISBN13:** 9780893758561

1070L

Geeks: How Two Lost Boys ...

by: Katz, Jon
Jesse and Eric were geeks: suspicious of authority figures, proud of their status as outsiders, fervent ...

Pages: 256 **ISBN13:** 9780767906999

790L

Who Was Thomas Alva Edison?

by: Frith, Margaret
One day in 1882, Thomas Edison flipped a switch that lit up lower Manhattan with incandescent ...

Pages: 112 **ISBN13:** 9780448437651 **Ages:** 8 to 12

1000L

Isaac Newton

by: Krull, Kathleen
What was Isaac Newton like? Secretive, vindictive, withdrawn, obsessive, and, oh, yes, brilliant. His imagination was ...

Pages: 128 **ISBN13:** 9780670059218 **Ages:** 8 to 12

Henry Ford and the Model ...

GN630L

by: O'Hearn, Michael
In graphic novel format, tells the story of Henry Ford and his popular Model T automobile.

Pages: 32 **ISBN13:** 9780736864800

Johann Gutenberg and the Printing ...

GN620L

by: Olson, Kay Melchisedech
In graphic novel format, tells the story of Johann Gutenberg and the invention of the printing ...

Pages: 32 **ISBN13:** 9780736864824

Levi Strauss and Blue Jeans

GN600L

by: Olson, Nathan
In graphic novel format, tells the story of Levi Strauss and the evolution of blue jeans.

Pages: 32 **ISBN13:** 9780736864848

Benjamin Franklin: An American Genius

GN610L

by: Olson, Kay Melchisedech
In graphic novel format, tells the life story of American statesman and inventor Benjamin Franklin.

Pages: 32 **ISBN13:** 9780736846295

George Washington Carver: Ingenious Inventor

GN600L

by: Olson, Nathan
In graphic novel format, tells the life story of the plant scientist and inventor George Washington ...

Pages: 32 **ISBN13:** 9780736854849

Thomas Edison: Inventor, Scientist, and ...

700L

by: Mortensen, Lori
Discusses the life of inventor Thomas Alva Edison, who changed the world in which he lived ...

Pages: 24 **ISBN13:** 9781404831056

George Eastman and the Kodak ...

GN620L

by: Fandel, Jennifer; Milgrom, Al
Graphic novel format story of George Eastman, whose invention of the hand-held camera revolutionized people's lives.

Pages: 32 **ISBN13:** 9780736868488

Marie Curie

1050L

by: Krull, Kathleen
Talk about a ?glowing reputation?! Marie Curie, the woman who coined the term radioactivity, won not ...

Pages: 144 **ISBN13:** 9780670058945 **Ages:** 8 to

George Washington Carver: Teacher, Scientist, ...

730L

by: Mortensen, Lori
Brief biography highlights some important events in the life of George Washington Carver, teacher, scientist, and ...

Pages: 24 **ISBN13:** 9781404837256

Louis Braille

680L

by: Donaldson, Madeline
Biography of the blind French boy who invented the Braille alphabet when he was only fifteen.

Pages: 48 **ISBN13:** 9780822576082

Albert Einstein: Universal Genius

910L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531149751

Marie Curie: Scientist Who Made ...

840L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531149775

Nikola Tesla: Physicist, Inventor, Electrical ...

1010L

by: Burgan, Michael
Biography of physicist Nikola Tesla, who developed the alternating current electric power system that lights up ...

Pages: 112 **ISBN13:** 9780756540869

Bill Gates

1130L

by: Aronson, Marc
Bill Gates is many things: the richest person in the world; the ruthless businessman who co-founded ...

Pages: 192 **ISBN13:** 9780670063482

Tales of Famous Americans

740L

by: Roop, Connie; Roop, Peter
A perfect introduction to some of the people who built, changed, and challenged the U.S.A., Tales ...

Pages: 112 **ISBN13:** 9780439641166 **Ages:** 8 to 11

Ben Franklin: Inventing America

1150L

by: Fleming, Thomas
Perhaps more than even Washington, Jefferson, or Adams, Ben Franklin is the Founding Father who best ...

Pages: 192 **ISBN13:** 9781402741432 **Ages:** 12 to Young Adult

(19+)

Benjamin Franklin: Electrified the World ...

910L

by: Venezia, Mike
These books are without a doubt the definitive and most entertaining biographies of scientists for young ...

Pages: 32 **ISBN13:** 9780531237014 **Ages:** 8 to 11

Steve Jobs and Steve Wozniak: ...

940L

by: Venezia, Mike
An introduction to the lives and careers of Steve Jobs and Steve Wozniak, founders of Apple ...

Pages: 32 **ISBN13:** 9780531237304 **Ages:** 8 to 11

Louis Pasteur and Pasteurization

GN770L

by: None
ISBN13: 9781406215700

Bill Gates: Entrepreneur and Philanthropist

1040L

by: Lesinski, Jeanne M.
A biography of the man who created Microsoft, from his childhood to his battle in court ...

Pages: 112 **ISBN13:** 9781580135702 **Ages:** 11 to 14

Alexander Graham Bell Graphic Biography

GN530L

Fast-paced and easy-to-read, these softcover 25-page graphic biographies teach students about historical figures: those who lead ...

Pages: 25 **ISBN13:** 9781599052137 **Ages:** 12 to 18

Marie Curie Graphic Biography

GN530L

Fast-paced and easy-to-read, these softcover 25-page graphic biographies teach students about historical figures: those who lead ...

Pages: 25 **ISBN13:** 9781599052267 **Ages:** 12 to 18

Walt Disney Graphic Biography

GN760L

Fast-paced and easy-to-read, these softcover 25-page graphic biographies teach students about historical figures: those who lead ...

Pages: 25 **ISBN13:** 9781599052304 **Ages:** 12 to 18

It's a Snap!: George Eastman's ...

470L

by: Kulling, Monica
In 1877 in Rochester, New York, George Eastman couldn't understand why picture-taking was so difficult. Having ...

Pages: 32 **ISBN13:** 9780887768811 **Ages:** 5 to 8

Thomas Edison: Incredible Inventor

620L

by: Tourville, Amanda Doering

Pages: 32 **ISBN13:** 9781616419363 **Ages:** 5 to 9

Who Invented Basketball? James Naismith

690L

by: Latta, Sara L.

Pages: 24 **ISBN13:** 9780766039650 **Ages:** 5 to 8

George Washington Carver

520L

by: McKissack, Fredrick; McKissack, Patricia

Pages: 24 **ISBN13:** 9780766041028 **Ages:** 5 to 8

The Story of Thomas Alva ...

950L

by: Cousins, Margaret

Beginning with Thomas Edison's childhood, when he set up his first laboratory in his basement as ...

Pages: 192 **ISBN13:** 9780394848839

The Story of Benjamin Franklin: ...

760L

by: Davidson, Margaret

Ben Franklin was an amasing American because he was: * a printer and businessman who created ...

Pages: 96 **ISBN13:** 9780440400219

George Washington Carver

950L

by: Labreque, Ellen

Pages: 32 **ISBN13:** 9781410962409 **Ages:** 7 to 9

George Washington Carver

950L

by: Labreque, Ellen

Pages: 32 **ISBN13:** 9781410962478 **Ages:** 7 to 9

Louis Pasteur

940L

by: Hunter, Nick

Pages: 32 **ISBN13:** 9781406272482 **Ages:** 7 to 9

Who Is Bill Gates?

720L

by: Demuth, Patricia Brennan

Pages: 112 **ISBN13:** 9780448463322 **Ages:** 8 to 12

Who Was Milton Hershey?

780L

by: Buckley Jr., James

Pages: 112 **ISBN13:** 9780448479361 **Ages:** 8 to 12

Johann Gutenberg and the Amazing ...

AD1240L

by: Koscielniak, Bruce
If a book was published 600 years ago, it would have been copied out by hand ...

Pages: 40 **ISBN13:** 9780618263516

Levi Strauss Gets A Bright ...

AD610L

by: Johnston, Tony

Pages: 32 **ISBN13:** 9780152061456 **Ages:** 5 to 7

To Fly: The Story of ...

780L

by: Old, Wendie C.
Orville and Wilbur Wright were a fascinating pair. Not only did they invent, build, and fly ...

Pages: 48 **ISBN13:** 9780618133475

Sir Isaac Newton and the ...

800L

by: Weir, Jane
Isaac Newton is considered one of the greatest scientists who ever lived. His work changed the ...

Pages: 32 **ISBN13:** 9780743905749

Out of Darkness: The Story ...

1000L

by: Freedman, Russell
A biography of the modest Frenchman who, after being blinded at the age of three, went ...

Pages: 96 **ISBN13:** 9780395775165

Who Was Louis Braille?

780L

by: Frith, Margaret

Pages: 112 **ISBN13:** 9780448479033 **Ages:** 8 to 12

Click!: A Story about George ...

770L

by: Mitchell, Barbara
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 56 **ISBN13:** 9780876144725

Alexander Graham Bell

650L

by: McPherson, Stephanie Sammartino
An introduction to the life and career of the inventor Alexander Graham Bell.

Pages: 48 **ISBN13:** 9780822585435

Mr. Blue Jeans: A Story ...

960L

by: Weidt, Maryann N.
Carolrhoda's best-selling Creative Minds Biographies series appeals to a wide range of readers. Written in story ...

Pages: 64 **ISBN13:** 9780876145883

Who Were the Wright Brothers?

890L

by: Buckley Jr., James

Pages: 112 **ISBN13:** 9780448479514 **Ages:** 8 to 12

George Washington Carver

NC790L

by: Colins, Luke

Pages: 24 **ISBN13:** 9781476539577 **Ages:** 5 to 7

Who Was Alexander Graham Bell?

720L

by: Bader, Bonnie

Pages: 112 **ISBN13:** 9780448464602 **Ages:** 8 to 12

George Washington Carver

930L

by: MacLeod, Elizabeth

Pages: 32 **ISBN13:** 9781553379072 **Ages:** 8 to 12

Ben Franklin: His Wit and ...

760L

by: Schroeder, Alan

Benjamin Franklin devised armonicas and bifocals, helped bring us the Constitution and signed the Declarion of ...

Pages: 32 **ISBN13:** 9780823424351 **Ages:** 8 to 11

Who Was Marie Curie?

690L

by: Stine, Megan

Pages: 106 **ISBN13:** 9780448478968 **Ages:** 8 to 10

Who Was Isaac Newton?

840L

by: Pascal, Janet B.

Pages: 112 **ISBN13:** 9780448479132 **Ages:** 8 to 10

Who Was Walt Disney?

720L

by: Stewart, Whitney

Walt Disney always loved to entertain people. Often it got him into trouble. Once he painted ...

Pages: 112 **ISBN13:** 9780448467030 **Ages:** 8 to 12

Who Was Steve Jobs?

660L

by: Pollack, Pam

Pages: 112 **ISBN13:** 9780448479408 **Ages:** 8 to 12

Marie Curie

1050L

by: Krull, Kathleen

Talk about a ?glowing reputation?! Marie Curie, the woman who coined the term radioactivity, won not

...

Pages: 144 **ISBN13:** 9780142412657 **Ages:** 8 to 12

Who Was Robert Ripley?

850L

by: Anderson, Kirsten

Pages: 112 **ISBN13:** 9780448482989 **Ages:** 8 to 12

Who Was Ben Franklin?

600L

by: Fradin, Dennis Brindell

Pages: 112 **ISBN13:** 9780448466767 **Ages:** 8 to 12

Who Was George Washington Carver?

910L

by: Gigliotti, Jim

Pages: 112 **ISBN13:** 9780399539732 **Ages:** 8 to 12

Who Was George Washington Carver?

910L

by: Gigliotti, Jim

Pages: 112 **ISBN13:** 9780448483122 **Ages:** 8 to 12

Isaac Newton

980L

by: Steele, Philip

Born in England in 1643, Isaac Newton grew up in the age when Renaissance thinkers were ...

Pages: 64 **ISBN13:** 9781426314506 **Ages:** 8 to 12

George Washington Carver

570L

by: Kitson, Jazynka

Pages: 32 **ISBN13:** 9781426322853 **Ages:** 3 to 7

APPENDIX D

Know vs. No?

Name _____

Know vs. No?

- How well do you know these words?
- Mark each word to show your understanding.
- Discuss your choices with a partner.

Word	Don't know it at all	Have seen it or heard it	Have a guess about its meaning	Can use in a sentence	Am an expert on this word
inventor					
brainstorm					
opportunity					
engineer					
device					
factory					
manufacture					
prototype					
patent					
lawyer					

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX E

Think Sheets

Name _____

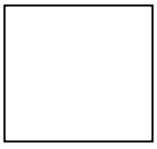
Important to Me/Important to the Author Think Sheet

Important to Me	Important to the Author

Self-Reflection: Color the box using the descriptions below.

- I can determine the difference between what I think is most important and the writer's big ideas.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Word/Inferred Meaning/Clues/Sentence Think Sheet

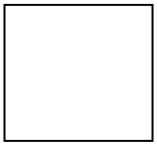
As you read, jot down unfamiliar words and use the context to infer the meaning.

Word	Inferred Meaning	Clues (picture/reading on/capital letters)	Sentence

Self-Reflection: Color the box using the descriptions below.

- I can determine the meaning of general academic and domain-specific words or phrases in a text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

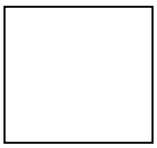
BK + TC = I (Background Knowledge + Text Clues = Inference) Think Sheet

BK	+	TC	=	I
	+		=	
	+		=	
	+		=	

Self-Reflection: Color the box using the descriptions below.

- I can refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

FQR: Facts/Questions/Response Think Sheet

Title _____

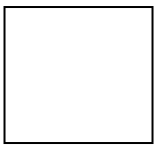
Author _____

Facts	Questions	Response

Self-Reflection: Color the box using the descriptions below.

- I can determine importance, ask questions, and respond to nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Main Idea and Details Think Sheet

Main Idea: What the text is mostly about or the big idea the author wants you to understand (can be topic sentence or concluding sentences in a paragraph)

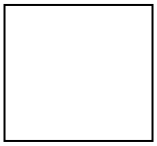
Details: Facts and examples that help support the main idea

Main Idea:
Detail 1:
Detail 2:
Detail 3:

Self-Reflection: Color the box using the descriptions below.

- I can determine the main idea and details in nonfiction text.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Read with a Question in Mind Think Sheet

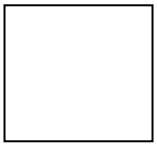
Question: _____

Notes	Thinking

Self-Reflection: Color the box using the descriptions below.

- I can read with a question in mind.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



Name _____

Use Text and Visual Features to Gain Information Think Sheet

Book Title _____

Feature	**Purpose**

Using the text and visual features, write down something you learned from your book.

_____

_____

_____

_____

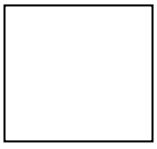
_____

_____

Self-Reflection: Color the box using the descriptions below.

- I can use text features to gain information.

  Green = I really get it.
  Yellow = I am doing okay.
  Red = I need some help.



APPENDIX F

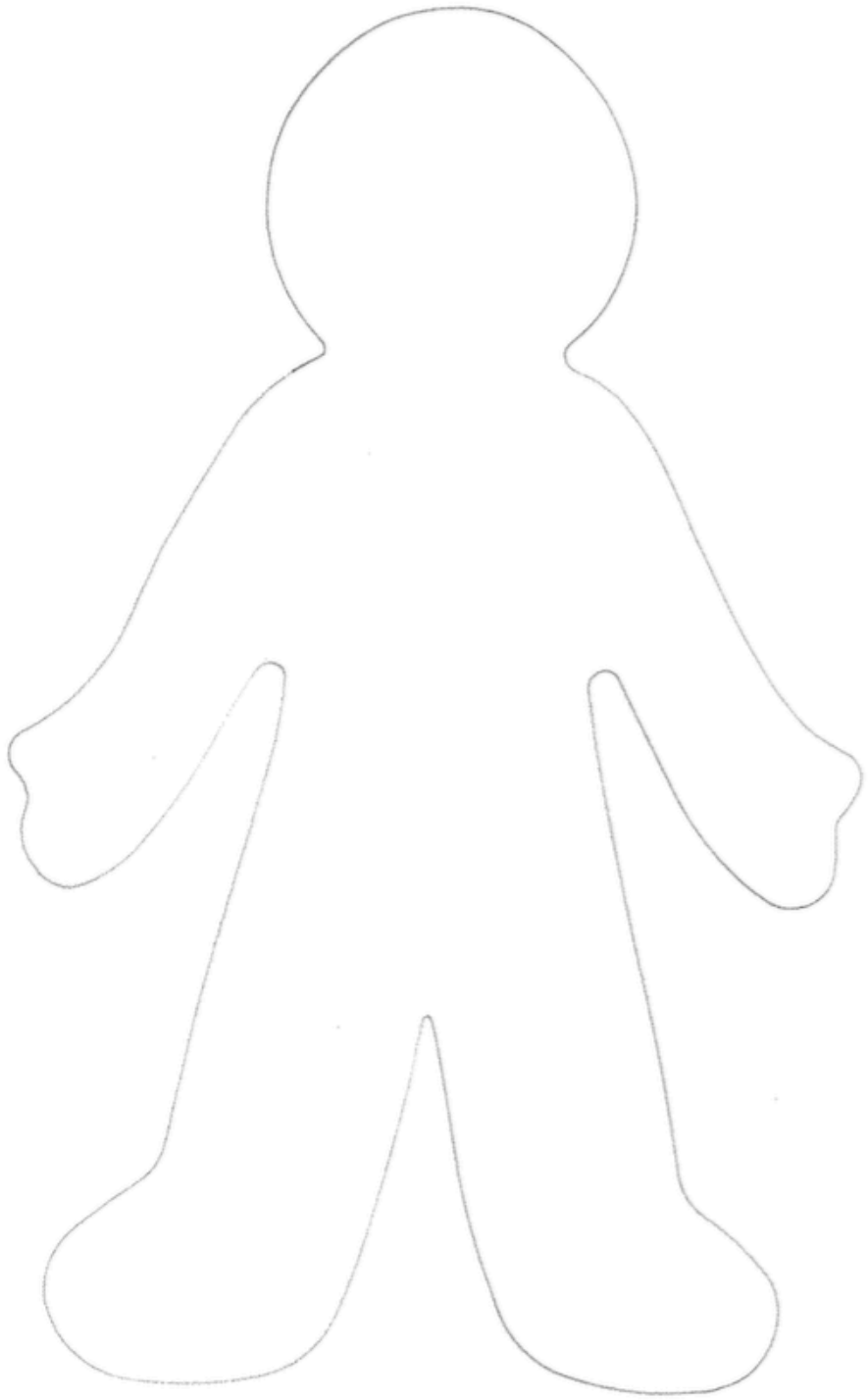
Learning Profile

Learning Profile

*Your face and hair should represent who you are and what you look like now.

* You can draw or cut out additional things that you want me to know about you and add them to your person.

* Remember, you will be cutting this out neatly once you are done.



Shirt/top

- Stripes if you prefer to work alone
- Polka dots if you prefer to work with a partner
- Zig zags if you prefer to work in groups

Pants/skirt/shorts/capris

- Green if you are good in math
- Yellow if you are good at science
- Blue if you are a good reader
- Orange if you are good in social studies

Shoes

- Red if you learn best by reading and writing
- Brown if you learn best by doing things
- Purple if you learn best by discussing and talking about what you are learning

In your hand

Draw 

if you love music, like to sing and play instruments

Draw 

if you like to exercise, play sports, and move

Draw 

if you like to read, write, talk, and listen.

Draw 

if you like numbers of all sorts, patterns, and solving problems

---

Draw 

if you enjoy photography, are good with directions, good at drawing, and can visualize pictures in your head

---

Draw 

if you like to learn about nature, enjoy gardening, like having pets, appreciate the outdoors

	Stripes – alone	Polka dots- partner	Zig zags -group		Green –Math	Yellow –Science	Blue – Reading	Orange –Social Studies		Red – Reading and Writing	Brown –doing things	Purple – discussing/talking		Notes- music	Ball –kinesthetic	Book – read, write, talk	Numbers –numbers/ patterns/problem solving	Picture frame – photography, directions, drawing, visualize pictures in head	Leaf – nature, gardening, pets, outdoors			
1.																						
2.																						
3.																						
4.																						
5.																						
6.																						
7.																						
8.																						
9.																						
10.																						
11.																						
12.																						
13.																						
14.																						
15.																						
16.																						
17.																						
18.																						
19.																						

APPENDIX G

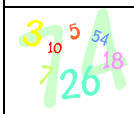
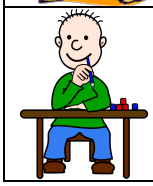
Problem Solving Centers

Name _____

Problem Solving Centers – Student Table

Requirements:
Over the next four weeks, you must do at least one activity from each of the eight centers. Record the date and the activity option chosen in the correct box below.

As you go to each center, think about the following questions:
Why do people invent?
How do inventors solve problems?
What do you do with an idea?

	Week 1	Week 2	Week 3	Week 4
				
				
				
				
				
				
				
				

Musical Problem Solving Center

1. Write an advertising jingle.

2. Make a list of songs that calm, stimulate, or inspire you.

3. Make a musical instrument using the materials provided.

4. Create new lyrics to a pre-existing song/rhyme/rhythm.

5. Add sound effects to a story using instruments/items around the classroom.

Bodily-Kinesthetic Problem Solving Center

1. Explore with pool noodle pieces and toothpicks or play dough. Build. Sculpt. Create.

2. Engineer a new drinking straw and see if it works using straws and cups.

3. Create an obstacle course using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops.

4. Build a working pulley using: cardboard tubes, lids, pencils, cups, strings, spools

5. Build a catapult using: tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power.

Linguistic Problem Solving Center

1. Write a thank you note to an inventor expressing your gratitude for his/her contributions to the world and/or his/her creativity and ability to solve problems.

2. Solve word finds, crossword puzzles, or create your own word puzzle.

3. Create a book/list of fun facts about an inventor.

4. Read Roget's original thesaurus. Compare and contrast it to *Roget's 21st Century Thesaurus.* Create lists like Roget.

5. Write a fantasy about an inventor and his/her creation. Think: Mary Shelley who created *Frankenstein*.

Logical-Mathematical Problem Solving Center

1. Create patterns, designs, and imaginary figures using tangrams or geoboards and geobands.

2. Using clothes pins and playing cards, create a pattern or game.

3. Using the binary alphabet code provided, create words/messages with Legos and a base plate.
   - 1= White 0= Blue
   - https://www.kidscodecs.com/a-binary-numbers-tutorial-with-1-and-0/

4. Explore measurement with the following supplies: tape measure, ruler, wood pieces, pencil

5. Look at the patents. What is similar and different about the patents? What do you find interesting?

Spatial Problem Solving Center

1. Assemble environmental print puzzles using magazines, cardboard food boxes, and junk mail.

2. Create using the torn paper, paint spills, bent paper, coffee stains, holes, crumpled paper. Reference *Beautiful Oops!* by Barney Saltzberg if you need inspiration.

3. Build a Lego maze testing it with a marble.

4. Map an obstacle course onto graph paper using: 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, and 5 hula hoops

5. Think of a complex way to solve a simple problem. Then create a Rube Goldberg inspired comic. Reference the Rube Goldberg comic book.

Naturalist Problem Solving Center

1. Collect items outside at recess. Create something with your artifacts.

2. Imagine you are in one of the scenic pictures provided. What are you feeling, experiencing, doing?

3. Photograph and print an image from the outdoors. Write a description, caption, and/or poem for your photograph.

4. Using a microscope, explore different slides. What do you see?

5. Brainstorm and record solutions to environmental problems. Example: the problem with trash, how to prevent/clean up oil spills, how to decrease our environmental footprint

Interpersonal Problem Solving Center

1. Create an advertisement for an invention that has helped you. Make sure to show the product and persuade the audience/buyer/customer why they need the invention/product.

2. Play Mouse Trap.
    - View life-sized Mouse Trap: https://www.youtube.com/watch?v=Rdqrdw8qt3Y

3. Build a tic-tac-toe board using Legos and a base plate. Then play tic-tac-toe with a partner.

4. Invent a new game to play with others using cardboard and miscellaneous items from container

5. Create a skit that demonstrates one of the unit vocabulary words: brainstorm, factory, manufacture, production, engineer, patent, device, opportunity, prototype, lawyer. Look up the word in the dictionary to confirm the definition.

Intrapersonal Problem Solving Center

1. Imagine and journal about life without one of your favorite inventions (books, light switch, refrigerator, bicycle, pencil).

2. Read about a topic that interests you.

3. Reflect on a way to solve a problem. Write down your problem and solution.

4. Spend time in quiet thought.

5. Set a goal for a problem you would someday like to solve. Write your goal in your reading response notebook

For Teacher Reference

Musical Problem Solving Center Materials :

1. paper and pencil
2. paper and pencil
3. recyclable materials
4. paper and pencil
5. instruments

Bodily-Kinesthetic Problem Solving Center Materials:

1. pool noodle pieces, toothpicks and play dough
2. straws, straw making kit from dollar store, mini cups
3. 1 jump rope, 2 juggling scarves, 3 tennis balls, 4 cones, 5 hula hoops
4. cardboard tubes, lids, pencils, cups, strings, spools
5. tongue depressors, zip ties, binder clips, rubber bands and caps of bottles with pencil top erasers or pompoms as firing power
   Idea from http://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/

Linguistic Problem Solving Center Materials:

1. paper and pencil
2. word finds, crossword puzzles, paper
3. paper and pencil
4. Roget's original and 21st century thesaurus
5. paper and pencil

Logical-Mathematical Problem Solving Center Materials:

1. tangrams, geoboards and geobands
2. clothes pins and decks of cards
3. Binary code sheet, Legos: white, blue, and one additional color, base plate
4. tape measure, rule, wood pieces, pencil
5. printouts of patents

Spatial Problem Solving Center Materials:

1. cut up magazines, food boxes, and junk mail
2. torn paper, paper with paint spills, bent paper, coffee stained paper, paper with holes, crumpled paper
3. Legos, base plate, marble
4. graph paper and pencil
5. Rube Goldberg comic book, paper, pencil, colored pencils

Naturalist Problem Solving Center Materials:

1. bucket to collect artifacts
2. calendar of outdoor scenes
3. camera and printer, paper and pencil
4. microscope and slides
5. paper and pencil

Interpersonal Problem Solving Center Materials:

1. props
2. Mouse Trap game
3. Legos and base plate
4. cardboard and miscellaneous items to serve as game pieces
5. dictionary, props

Intrapersonal Problem Solving Center Materials:

1. journal, reading response notebook and pencil
2. book corner
3. paper and pencil
4. quiet space
5. reading response notebook and pencil

Name _____

Problem Solving Centers – Reflection

Look at your Problem Solving Centers table and draw a symbol to mark your thinking.

	your favorite center
	the center that made you think like an inventor
	the most challenging center for you

- Respond to the following questions using what you learned from the Problem Solving Centers.
- Write your thinking/answers in complete sentences.

Why do people invent?
Give a specific example from your experience doing a Problem Solving Center.

_____

_____

_____

_____

_____

How do inventors solve problems?
Give a specific example from your experience doing a Problem Solving Center.

_____

_____

_____

_____

_____

_____

What do you do with an idea?
Give a specific example from your experience doing a Problem Solving Center.

APPENDIX H

Anecdotal Notes

Problem Solving Centers - Anecdotal Notes

	Week 1 Observations
List student names here	

Problem Solving Centers - Anecdotal Notes

	Week 4 Observations
List student names here	

APPENDIX I

R.A.F.T.

R.A.F.T. Project Options

*Project work time provided in class: Day 16 (1/2 day), Day 17, and Day 19.
*Due/Present: Day 20

Role	Audience	Format	Topic
Inventor (that your read about) 	Parents of fourth grade students	Infomercial	Write and perform an infomercial trying to sell one of your inventions. Make sure to inform the audience about your invention using persuasive language.
Historian 	Museum guest	Memory box	Create a memory box of artifacts special to your inventor. Include a description of each artifact and its importance.
Morning show host  	Television viewers	Interview	Interview your inventor about his/her product, his/her trial and error process, and qualities needed to be an inventor.
Researcher 	Fourth grade students	Timeline	Create a timeline of 10 important life events (dates and descriptions), along with at least five pictures.
Inventor  	To self	Diary entry	Write 5 diary entries about 5 major life events (invention process/trial and error/how you overcame obstacles)
Inventor  	Patent attorney	Detailed drawings and description	Draw, label, and describe three detailed diagrams of one of your inventions that could be patented.
Musician/Inventor  	Radio listeners	Advertisement jingle	Create and perform a catchy jingle to get people to buy one of your inventions.
Cartographer 	Fourth grade students	Map	Make a map of the area where your inventor lived and worked throughout his/her life. Plot and label the towns/cities/location where he/she lived and worked.

R.A.F.T. Project Rubric

Name _____

R.A.F.T. Project Rubric					
R.A.F.T. requirements met and obvious	1	2	3	4	
Explanation and accuracy of events, ideas, or concepts in a historical text	1	2	3	4	5
Overall quality	1	2	3	4	5
Oral presentation (volume, clarity)	1	2			
Comments:	**Total:**			**/16**	

APPENDIX J

Independent Reading Project

Name _____

Independent Reading Project– Biography

Use this form to map out your reading over the next two weeks.

Ideas:

- Write out how many pages and chapters you should read in a day/week.
- If you are reading multiple biographies about your inventor, write when you would like to read each book.
- Some reading may need done at home.

Name of Inventor _____

Book Title(s) _____

_____

_____

Week 1	Week 2
Monday: 30 minutes in class	Monday: 30 minutes in class
Tuesday: 30 minutes in class	Tuesday:
Wednesday:	Wednesday:
Thursday:	Thursday:
Friday:	Friday: 45 minutes in class

Name _____

Independent Reading Conference Form – Biography

Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:
Date:	Title of book_____ page _____ Student questions: Teacher questions: Comments:

Potential teacher questions (to dig deeper):

- *What challenges did this person face? How did he/she work to overcome these challenges?*
- *Describe a difficult decision the person had to make. Do you think you would have made the same choice? Why?*
- *What do most people think is this person's most significant accomplishment? Do you think the person would agree that this was the most important thing he/she did? Why or why not?*
- *Why would an author write a biography about this individual?*
- *From what you have read so far, tell about an event that was very influential on the choices the person made in his/her life.*
- *What do you admire about the person in this biography? Why? How might you become more like this person?*
- *What do you think school was like for the person about whom this biography was written? Explain.*

APPENDIX K

Readers Theater Scripts

GEORGE WASHINGTON CARVER INTERVIEW

By Kathy Applebee

AT RISE: TV station. Several people are seated waiting for the reporters to ask them questions.

REPORTER 3: Welcome to the Super Scientist show. Today we are interviewing people who knew the plant doctor – George Washington Carver.

REPORTER 2: We have Mr. Moses Carver, his first teacher and a college professor ready to answer questions about this marvelous man.

REPORTER 1: Mr. Moses Carver, what was George like as a boy?

MR. CARVER: Sickly. As a baby, George got a disease called whooping cough that weakened his body but not his mind.

REPORTER 1: What was he able to do?

MR. CARVER: His chores were cooking, sewing and tending the garden. We called him the plant doctor.

REPORTER 2: You were his elementary school teacher. What was it like teaching in Missouri right after the Civil War?

TEACHER 1: It was hard to teach everyone because I had 75 children in one small classroom. But it didn't stop George. He was motivated to get an education.

REPORTER 2: How did you know that?

TEACHER 1: He taught himself to read. His family was so poor he couldn't afford to buy a pencil.

REPORTER 5: Did he write with a peanut?

TEACHER 1: No, he made a holder and used a tiny pencil that was only 1/4 inch long.

REPORTER 2: That was clever of him.

TEACHER 1: He was smart but also hard working. When other children played at recess, George studied. Soon, he knew more than I did.

REPORTER 3: Did he go to college?

TEACHER 1: Not right away. Some colleges would not take black students. Ask his botany professor.

REPORTER 3: First I must ask, what is botany?

PROFESSOR: The study of plants. George Washington Carver was the best botany student on campus.

REPORTER 3: What kinds of things did he study?

PROFESSOR: Carver started studying the diseases that attacked the farmers' crops. He also experimented to find new ways to use different plants – especially peanuts.

TEACHER 1: He made more than 300 products from peanuts.

PROFESSOR: He even made soap and ink from peanuts.

MR. CARVER: He also made 118 products from sweet potatoes, including flour and candy.

PROFESSOR: He made 75 products from pecans, another type of nut grown in the South.

MR. CARVER: He even figured out a way to make walls from cotton stalks.

REPORTER 3: Sounds like he had many good ideas!

TOM: He was brilliant. By 1938, peanuts had become a $200 million industry and a chief product of Alabama.

REPORTER 3: Who are you?

TOM: Thomas Edison.

REPORTER 5: The light bulb guy!

REPORTER 3: Mr. Edison, how did you know George?

TOM: Yes. I offered him $100,000 a year to work for me, but he said "no."

PROFESSOR: George thought he could do more good teaching at Tuskegee.

REPORTER 1: Here comes Mr. George Washington Carver himself. Mr. Carver, what advice would you give people today?

GEORGE WASHINGTON CARVER: Reuse and recycle. Once I found an old stove at the city dump and recycled back into use.

TEACHER 1: He used old wrapping paper for notebooks.

GEORGE WASHINGTON CARVER: Don't throw anything away after just one use; everything can be used again.

REPORTER 2: Is it true you became a teacher as well as a scientist?

GEORGE WASHINGTON CARVER: Yes. Booker T. Washington offered me a job teaching at the Tuskegee Institute in Alabama.

REPORTER 2: We you a tough teacher?

GEORGE WASHINGTON CARVER: I insisted my students do each experiment right.

REPORTER 1: What if they said it was "about right"?

GEORGE WASHINGTON CARVER: If it's '*about* right', then it's wrong."

REPORTER 3: How many patents do you have?

GEORGE WASHINGTON CARVER: Just three.

REPORTER 5: Why didn't you patent your inventions?

GEORGE WASHINGTON CARVER: I felt like the God gave me the discoveries I made at Tuskegee, so I couldn't sell them to someone else. I let everyone use them.

REPORTER 5: Didn't you want to have a big house and money and stuff?

GEORGE WASHINGTON CARVER: No. The truly successful person is the one who has learned to serve others.

REPORTER 1: Is that why you donated over $30,000 to the George Washington Carver Foundation?

REPORTER 2: And willed the rest of your estate to that organization?

GEORGE WASHINGTON CARVER: Yes, I wanted my work to carry on after I died.

A Readers' Theater Adaptation of Emily Arnold McCully's *Marvelous Mattie: How Margaret E. Knight Became an Inventor*
by Nicki Stohr

Characters:

Charlie	Mattie	Overseer	Narrator 1	Narrator 4
Jim	Town Boy	Factory Worker	Narrator 2	Narrator 5
Mother	Mr. Baldwin	Sadie	Narrator 3	Narrator 6

Narrator 2: This script comes from the biographical picture book, *Marvelous Mattie: How Margaret E. Knight Became an Inventor* by Emily Arnold McCully.

Narrator 1: Mattie Knight lived in a little house in York, Maine, with her widowed mother and older brothers, Charlie and Jim. They were poor, but Mattie didn't feel poor because she had inherited her father's toolbox.

Narrator 3: When she thought of things that could be made with the tools, she drew them in a notebook labeled *My Inventions*. Her brothers called the sketches Mattie's brainstorms.

Narrator 6: Mattie mad a whirligig for Charlie, a jumping jack for Jim and a foot warmer for her mother because she sat up late on cold nights sewing in order to earn a living.

Narrator 5: One spring, Charlie and Jim said,

Charlie: Won't you make us a special kite?

Narrator 4: Mattie sketched a few kites with different shapes and struts. She picked the best one and set to work on it.

Mother: What's Mattie doing now?

Jim: She had a brainstorm

[Mother shook her head.]

Narrator 3: Mattie was a strange girl, she was happiest with her pencil, her jackknife, and her hammer.

Narrator 1: Mattie and the boys took the finished kite to Ward's Hill. Jim ran with it into the wind.

Mattie: Faster!

Narrator 4: The kite trembled briefly, took a dive, then it rose on a sudden gust.

Charlie: Yahoo!

Narrator 2: The kited soared higher and higher.

Town Boy: Who made that?

Charlie: Mattie made it.

Town Boy: She didn't! A girl couldn't make that!

Narrator 6: The following winter, Mattie made sleds for Charlie and Jim, and they won every race down Ward's Hill. Four boys asked Mattie to make sled for them to race.

Mattie: It'll cost you a quarter apiece.

Narrator 5: The boys agreed, and every afternoon after school Mattie worked on the sleds. She gave the money to her mother, but the family was still poor.

Narrator 1: When Mattie was eleven, Mrs. Knight gathered the children together.

Mother: I've heard there are jobs in the textile mills in Manchester, New Hampshire. The boys and I will work, and Mattie will go to school until she is twelve. The company will rent us a house.

Narrator 4: Manchester was a brand-new town. With her family gone for thirteen hours every day, Mattie was lonely.

Narrator 2: After school, while she waited for them to come home, she liked to explore the complex of mills, but the overseers chased her from the spinning and weaving rooms.

Narrator 3: One day, she heard a tremendous roar coming from a building. She went inside and saw that men were building a huge iron machine. Mattie opened her notebook and began to sketch.

Mr. Baldwin: Have you lost you way, little miss?

Mattie: This is a machine shop, isn't it?

Mr. Baldwin: Well, what does a young girl want here?

Mattie: I love machines!

Mr. Baldwin: I guess you must. Our shop usually repairs looms, but we've been asked to manufacture this a locomotive.

Mattie: What's it for?

Mr. Baldwin: Why, for the railroad! This is the *General Washington*. It will haul cars on the New York Central lines."

Narrator: Mattie had lots of questions for Mr. Baldwin and he graciously answered them. Mattie felt very much at home in the machine shop. She told her family what she'd discovered.

Mother: Whatever will this lead to?

Narrator 5: When Mattie turned twelve, she went to work in the mill, rising with the four-thirty bell in the morning and trudging home to the seven-thirty bell at night. One day, a shuttle shot off the end of a loom and slammed into a girl's head. The injured girl was Rebecca, who lived next door to Mattie's family.

Overseer: Out of the way!

Narrator 6: Rebecca was carried out while the looms clattered on and the other girls tried not to lose their threads. Nothing ever halted production.

Factory Worker: Horrible! It's the fault of the machines!

Narrator 3: After work, Mattie walked home with her family. She went over and over the sequence of events that had led to the accident. She pictured the shuttle, what it was supposed to do, and how it had gone wrong. A machine was an invention and could always be improved.

Narrator 2: That evening, there was a vigil for Rebecca. A weaver said it wasn't uncommon for threads to snap, making missiles of the shuttles. Mattie sat scribbling in her notebook. Suddenly, an idea took shape. A metal guard attached to the box plate would stop a shuttle that had run off the track. It was simple. If only she could try it out!

Narrator 1: Mattie showed her notebook to Mr. Baldwin.

Mr. Baldwin: My goodness! These are the drawings of a real inventor and I think your solution is right! I'm going to take it to the boss.

Narrator 4: The head engineer was impressed and showed Mattie's idea to one of the mill owners. A few weeks passed. Rebecca got better. Then, one day, workmen arrived and began installing metal guards on all the looms in every mill in Manchester.

Narrator 5: The guards worked just as Mattie had designed them to do. Never again would someone be hurt by a runaway shuttle.

Mother: Oh, Mattie, I'm so proud of you!

Mr. Baldwin: You ought to own a patent on your idea.

Mattie: What's a patent?

Narrator 2: He explained that inventors registered their ideas with the government to protect them from being stolen.

Narrator 1: Once patented, an idea could be sold or the inventor could manufacture the device herself.

Mr. Baldwin: But I guess they wouldn't give a patent to a little girl.

Narrator 3: Mattie worked in the mill for a few more years. Cotton prices fell and production slowed. Mattie turned eighteen.

Mattie: I want to look for a better opportunity.

Mother: I will miss you but I know you must go.

Narrator 2: Mattie moved away from home and worked in several different factories. Then, after the Civil War, she heard of a job in Springfield, Massachusetts. It was in a factory that mass produced paper bags that used to be made by hand.

Narrator 3: Its machines cut paper from long rolls, then folded and pasted each length shut at the bottom, like an envelope. But the bags didn't stand upright, and the grocers had to use one hand to hold them open for filling. Bulky items tended to split the bags.

Narrator 1: In Springfield, Mattie shared a room with Sadie, who worked in a shoe factory. Mattie had not been working in the bag factory for a very long when a man mentioned that he knew someone who was trying to invent a better machine that could cut and glue a square-bottom bag. Such a machine would

make a far better product. Soon, Mattie heard about others who were trying to invent an improved machine.

Narrator 1: Mattie decided she must try to invent one herself. She set up a workshop in the basement of her rooming house and sketched possible improvements on the bag machine.

Sadie: It's past bedtime. Whatever are you doing?

Mattie: Inventing.

Sadie: Well, you're not like any girls I ever knew!

Narrator 2: Mattie explained what she was working on. Sadie took to checking up on her new friend.

Sadie: "How is it coming along?"

Mattie: We'll see.

Narrator 3: To find out what came out of Mattie's late nights read *Marvelous Mattie by* Emily Arnold McCully.

GEORGE FERRIS WHAT A WHEEL!

Barbara Lowell
Published by Grosset & Dunlap
Reader's Theater
Script Adapted by Ginny Sain, HeArtsong Creative Center
www.heartsongcreativecenter.com

Cast: Narrators 1-2, George Ferris, Engineers 1-2, Fair Official, Construction Workers 1-2
Crowd Members 1-2, Mrs. Ferris

Narrator 1: George Ferris was an engineer who had big ideas. He turned his big ideas into bridges made of steel.

Narrator 2: Bridges that crossed high over rivers. Bridges that were strong and safe.

George: "I am George Ferris and I make sure of that."

Narrator 1: Before George ever imagined designing and building bridges, he lived with his family on a ranch in Nevada. A waterwheel nearby scooped up river water.

George: "I would sit for hours and watch that wheel turn."

Narrator 2: When he grew up, George remembered everything about the waterwheel. He didn't know it would help him with his big ideas. But it did.

George: "In Chicago, I heard exciting news. A World's Fair will open there."

Engineer 1: "There will be lots to see and do. Like balloon rides."

Engineer 2: "An ostrich farm. And don't forget Buffalo Bill's Wild West Show."

Fair Official: "But I want something new. Something I have never seen before."

George: "I am just the person to create it."

Narrator 1: At first, George didn't like any of his ideas. Then the waterwheel popped into his head. He drew an enormous wheel with cars on it for people to ride in.

Narrator 2: This was his biggest idea ever. George showed the engineers his drawing.

Engineer 1: "It looks like a spider's web."

Engineer 2: "No one will ride on that."

Narrator 1: But George liked his idea.

George: "I'll make it work. I'll make it strong and safe."

Narrator 2: George asked an engineer friend to help him. They drew up a daring design. A giant wheel made of steel.

Narrator 1: It looked like a bicycle wheel. The 36 train-size cars were the best part. 2,160 people could ride on the wheel at the same time.

Narrator 2: George showed his design to the fair official.

Fair Official: "A thunderstorm will blow your wheel over. Your idea is too dangerous. Anyway, you will have to pay a lot of money to build it."

Narrator 1: George wouldn't give up on his biggest idea ever. Lucky for him, many people thought he was a terrific engineer. They gave him the money and he created a new company.

George: "The Ferris Wheel Company."

Narrator 2: George reworked his plans a bit. He would show the fair official that his Ferris wheel would be strong and safe.

Fair Official: "I have a lot of questions."

George: "I have all the right answers."

Narrator 1: The fair official finally said,

Fair Official: "Have your Ferris wheel ready by opening day."

Narrator 2: Building a strong bridge took years. Could George build his Ferris wheel in only five months?

George: "I hope so."

Narrator 1: George ordered steel parts, electric lights, and a 1,000-horsepower steam engine.

Narrator 2: He ordered an extra engine in case the first one broke down. Plus, air brakes to stop the wheel in an instant, and a 90,000 pound axle, the largest made at the time.

George: "Now it's time to start building."

Narrator 1: But the temperature dropped to 16 degrees below zero. The ground was frozen. What would the construction workers do?

Construction Worker 1: "We'll blast the frozen ground with dynamite. Then we'll dig down, but I know we'll hit quicksand."

Narrator 2: In Chicago?

Construction Worker 1: "Yes! Frozen quicksand."

Construction Worker 2: "We'll heat the quicksand up and pump it out. We'll dig deep into the earth and drill into the rock below."

Construction Worker 1: "Next, we'll push in steel bars. We'll connect the bars to the legs of the two towers, and we'll build those towers up."

Construction Worker 2: "Then we'll put the giant axle into place."

Narrator 1: All this work took a long time, would the Ferris wheel be finished by opening day?

Engineer 1: "They worked hard and fast."

Engineer 2: "But not fast enough."

Narrator 2: On May 1, the fair opened. The Ferris wheel wasn't finished.

Construction Worker 1: "That won't stop us."

Construction Worker 2: "We'll finish the job soon."

Narrator 1: At the beginning of June, the Ferris wheel, without the cars, was ready for a test.

Narrator 2: Everyone wondered…

Crowd Member 1: "Will it really work?"

Crowd Member 2: "Is it safe?"

George: "Of course!"

Narrator 1: The boilers fired up. Steam pushed into the engine. The brake was released and the Ferris wheel turned.

Crowd Member 1: "The construction workers jumped on."

Crowd Member 2: "People from all over the fair ran to watch."

Narrator 2: Next, the workers hung the first six cars. With the extra weight, would the wheel still work?

George: "Of course!"

Mrs. Ferris: "I'm Mrs. Ferris. George is a terrific engineer. I know it will work and I'm going for a ride."

Narrator 1: At the top of the wheel, 264 feet in the air, Mrs. Ferris jumped up on her chair and cheered.

Mrs. Ferris: "Hooray!"

Narrator 1: The last cars were hung. The lights were connected.

Narrator 2: Now people packed into six lines waiting to ride the Ferris wheel.

Crowd Member 1: "I can't wait. I've never seen anything like it."

Crowd Member 2: "I didn't think it would really work, but it's amazing."

Narrator 1: George and Mrs. Ferris hopped into one car. A 40-piece marching band squeezed into another.

Narrator 2: Up, up, up they went. The band played "America."

Mrs. Ferris: "George, your biggest idea ever works!"

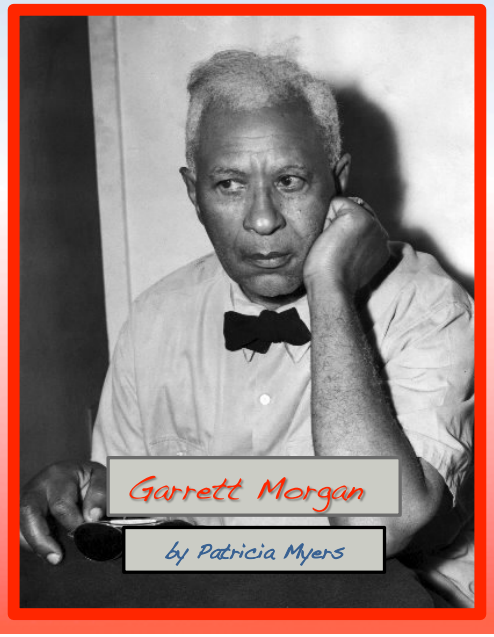
George: "Of course. I knew it would."

Reader's Theater

Adapted from

Garrett Morgan
Traffic Light Inventor

by Patricia Myers



Reader's Theater

If you are searching for a way to get your students to enjoy reading, become more expressive, read aloud with confidence, become more fluent…then let the magic begin!!

I have found using Reader's Theater with large and small groups really helps my students strengthen their reading and language arts skills! My class CHEERS every time I tell them we are going to do Reader's Theater!! This technique makes reading come alive for your students and can really develop a classroom full of confident readers! It is especially important that the stories are fun and engaging!

Reader's Theater is a great way to reach the individual needs of a variety of students at one time! Accelerated readers can continue to develop expressive reading, and develop or expand their vocabulary. Struggling readers are given a legitimate reason to read aloud and to re-read. Collaborating with peers is one of the most appealing features of Readers Theater; students did not feel alone as they read, they did not have to read the whole text, and they experience breaks between their reading.

Reader's Theater

Adapted from

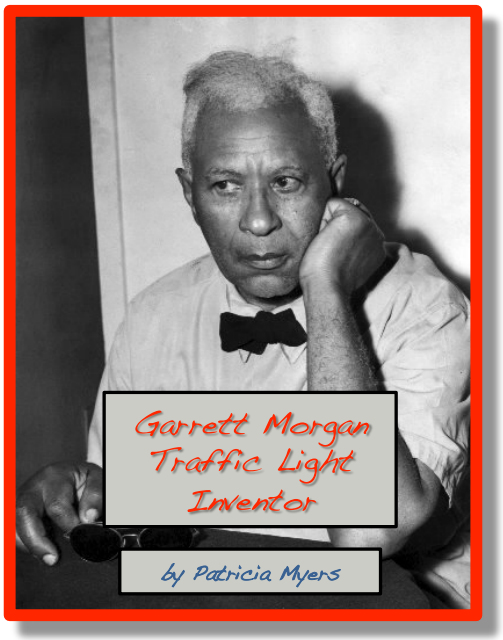
The Story of Garrett Morgan

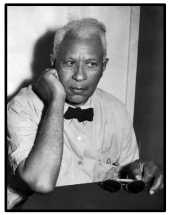
by Patricia Myers

Characters:

Narrator 1

Narrator 2





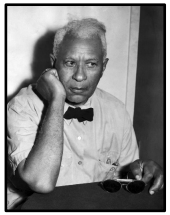
The Story of Garrett Morgan Traffic Light Inventor
Page 1

Narrator 1: Garrett Morgan was born the son of former slaves on March 4, 1877 in Claysville, Kentucky. He was the seventh of eleven children.

Narrator 2: Most of the people in Claysville were poor African Americans. They worked on farms or on the railroad.

Narrator 1: Garrett left school after fifth grade. At fourteen years old he went to Cincinnati, Ohio to look for better work.

Narrator 2: A rich farmer hired Garrett as a handyman. He made enough money to hire someone to teach him to read and write.



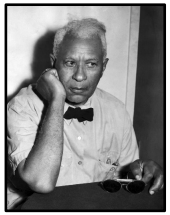
The Story of Garrett Morgan Traffic Light Inventor
Page 2

Narrator 1: Garrett Morgan knew that life would be harder for him if he did not learn these skills. He also had a knack for fixing things.

Narrator 2: When Garrett turned eighteen years old he moved to Cleveland, Ohio to work at a factory called Roots and McBride. It was a large clothing factory.

Narrator 1: He started out sweeping floors, but soon began fixing malfunctioning sewing machines that were used in this clothing factory.

Narrator 2: This job changed Garrett Morgan's life. He began to build a reputation throughout Cleveland for fixing things.



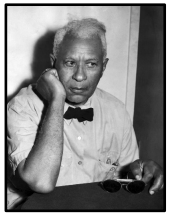
The Story of Garrett Morgan Traffic Light Inventor
Page 3

Narrator 1: Most of the sewing machines that Garrett was fixing had broken belts. This gave Garrett an idea about how to make the sewing machine belt work better.

Narrator 2: Garrett created a better, stronger sewing machine belt and showed it to the factory owners. They paid him $150.00 for his invention.

Narrator 1: Garrett's reputation was REALLY building now! He began fixing sewing machines at other factories.

Narrator 2: Before long, he opened his own sewing machine and shoe repair shop, a tailor shop, and a poultry business.



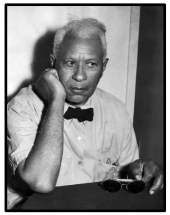
The Story of Garrett Morgan Traffic Light Inventor
Page 4

Narrator 1: Garrett Morgan was very busy, but he still found time to follow his true passion of creating new inventions to fix problems.

Narrator 2: He went on to create many important inventions to improve sewing machines. He also invented hat fasteners, hair straightening cream, and a gas mask.

Narrator 1: But the traffic light is Garrett Morgan's most used invention.

Narrator 2: On a beautiful day in 1922, Garrett witnessed a horse-drawn carriage and an automobile crashing into each other in a very busy intersection in Cleveland. This upset him very deeply.



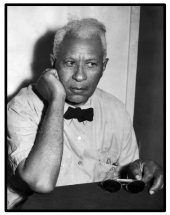
The Story of Garrett Morgan Traffic Light Inventor
Page 5

Narrator 1: The streets had a few signals with STOP and GO signs, but they were not very effective.

Narrator 2: People and drivers had no warning when traffic was going to stop or go in any direction. The streets were very dangerous.

Narrator 1: Garrett Morgan began drawing pictures of his ideas to improve signals for making traffic safer. After many, many drawings of ideas and experiments, he came up with a terrific idea.

Narrator 2: He drew a pole with lights and folding arms that said STOP and GO. He called his invention the Garrett A. Morgan Safety System.



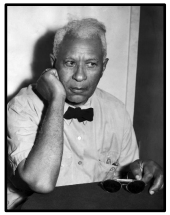
The Story of Garrett Morgan Traffic Light Inventor
Page 6

Narrator 1: This traffic signal was used for many years.

Narrator 2: It was the model for today's red-yellow-green traffic lights.

Narrator 1: To use the Garrett A. Morgan Safety System, a policeman stood next to his signal to pull the arms up and down.

Narrator 2: When STOP and GO were halfway down, it meant traffic should slow down because the signal was about to change.

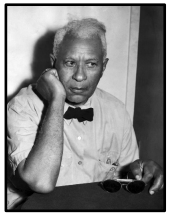


Narrator 1: If the STOP arms were down, ALL traffic had to stop so that people could walk across the streets.

Narrator 2: Garrett started the Garrett Morgan National Safety Company to sell his traffic signals.

Narrator 1: On November 20, 1923, Garrett was awarded a patent for his traffic light invention.

Narrator 2: That same year, Garrett sold his patent to the General Electric Company for $40,000.



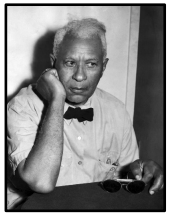
The Story of Garrett Morgan Traffic Light Inventor
Page 8

Narrator 1: Garrett's traffic signals began popping up all over Cleveland. Soon, other towns wanted to purchase them for their safety, too.

Narrator 2: After a while, other countries began using them.

Narrator 1: Garrett Morgan became a very rich man. He bought a large farm in Wakeman, Ohio.

Narrator 2: Garrett never forgot his roots, coming from a former slave family. He believed everyone should be able to have a good job, a nice home, and follow his or her dreams.



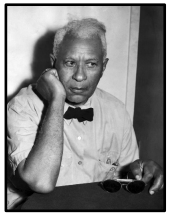
The Story of Garrett Morgan Traffic Light Inventor
Page 9

Narrator 1: Garrett was one of the first members of the Cleveland Association of Colored people. It later became part of the National Association for the Advancement of Colored People.

Narrator 2: Garrett created one of the first newspapers for African Americans called The Cleveland Call.

Narrator 1: Garrett Morgan continued to be a strong advocate for equal rights for all and to create many more inventions, including the electric curling iron!

Narrator 2: Garrett died on July 27, 1963 at the age of eighty-six.



The Story of Garrett Morgan Traffic Light Inventor
Page 10

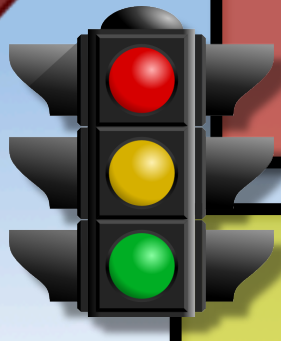
Narrator 1: Garrett did not start out with money or a good education, but that did not stop him from following his passions and dreams.

Narrator 2: He kept thinking up new ideas his entire life. He often told his children and grandchildren to work with their heads.

Narrator 1: Garrett Morgan definitely was a man that made our world a better and safer place to live.

Narrator 1 & 2: The end.

Reader's Theater



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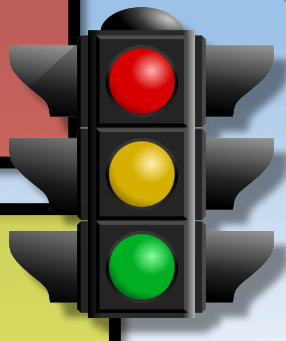

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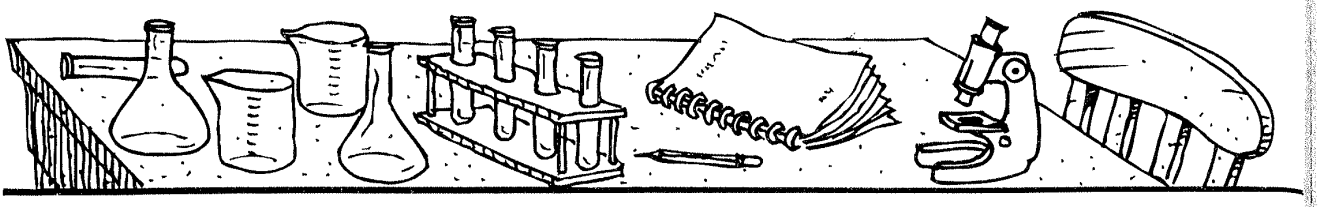


Louis Pasteur:

A Scientist Serving Humanity

Characters

Narrator 1	Marie
Narrator 2	Mrs. Meister
Louis	Joseph Meister
Mama	Doctor 1
Papa	Doctor 2

Narrator 1: Louis Pasteur was a French scientist who was born in 1822. During his lifetime he worked tirelessly to learn about germs. He learned that certain germs caused diseases.

Narrator 2: Louis Pasteur learned that he could grow germs in his laboratory. He could find a way to weaken the germs. Then he could inject the weakened germs into a healthy animal.

Narrator 1: The animal could fight off the weakened germs and not get sick. This process was called *vaccination.*

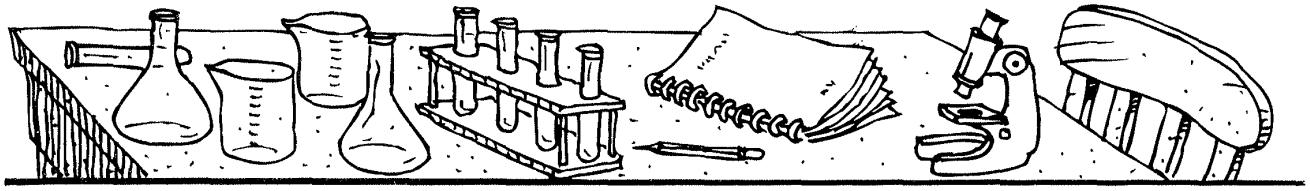
Narrator 2: Louis Pasteur did not invent vaccination. But he was the first to discover how to make vaccines from germs. His work has saved millions of lives all over the world.

Narrator 1: Even after solving the riddle of many diseases, Louis was still not satisfied. Toward the end of his life, he was determined to conquer one more disease: the deadly disease of rabies. His interest in this awful disease began when he was a small boy in a French village.

Mama: Louis, quick come in the house!

Louis: Why, Mama? I am playing.

Papa: *(somewhat angrily)* Now, Louis. Hurry. Don't argue!



Narrator 2: Hearing Papa's angry tone, Louis quickly obeyed. As he reached the doorway, his father pulled the boy inside and slammed the door. His mother hugged him and smiled at him, but he could see the worry in her eyes.

Louis: What's wrong, Papa? What's happening?

Papa: Come with me.

Narrator 1: Papa and Mama led Louis to the upper floor of the old house. From the window they could see most of the village. On the next street, Louis saw a fearsome sight.

Louis: It's a wolf, Papa! What is a wolf doing in the village? Wolves run in the woods, not here in our village.

Papa: That is no ordinary wolf, Louis. Look at him and tell me what you see.

Louis: He's very thin, isn't he, Papa? And look! Why does he have white foam around his mouth?

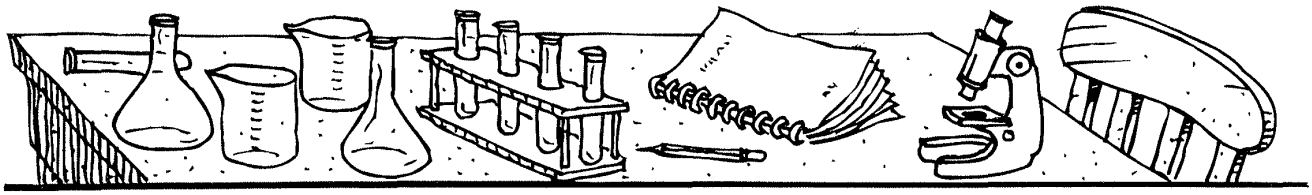
Papa: The wolf is sick. He has rabies. Anyone he bites will surely die.

Narrator 1: As Louis and his parents watched in horror, a woman from the village turned the corner into the street. The rabid wolf turned on her at once, biting her on the hand. Screaming, the woman broke free and ran into the nearest shop.

Mama: Oh, this is terrible. Come away now, Louis. This is not a sight for your young eyes.

Narrator 2: Mama drew Louis away from the window, but the scene haunted him for the rest of his life.

Narrator 1: Louis grew up and went to school. He was an average student during his early years. He showed great talent as an artist, and even considered a career as a portrait artist. However, as he began his advanced studies, he developed a deep interest in the world of science.



Narrator 2: His work on germs and their role in causing disease soon earned him great respect and fame throughout France and Europe. Louis and his wife settled in Paris, where he taught and continued his research. In time, he found answers to terrible diseases such as cholera and anthrax.

Narrator 2: Finally, in 1882, Louis was ready to turn his full attention to conquering rabies, the dreaded disease that had haunted him since childhood. He and his assistants developed shots that would prevent rabies in animals. Even if an animal had already been bitten, a series of Pasteur's special shots could stop the disease. One big question remained, however. Louis talked it over with his wife.

Louis: Will my shots work to stop rabies in people? I wonder . . .

Marie: Have patience, Louis.

Louis: I don't have time for patience, Marie! I am growing old and tired. I am over 60 years old already, and I want to finish this work!

Marie: I know, Louis. Your work is very important. But it is time for you to rest and let others carry on the work.

Louis: I can't put the responsibility on others. Perhaps . . . perhaps I will test the rabies shots on myself.

Marie: Louis, you can't be serious. What a dreadful idea! I could not bear such a thing!

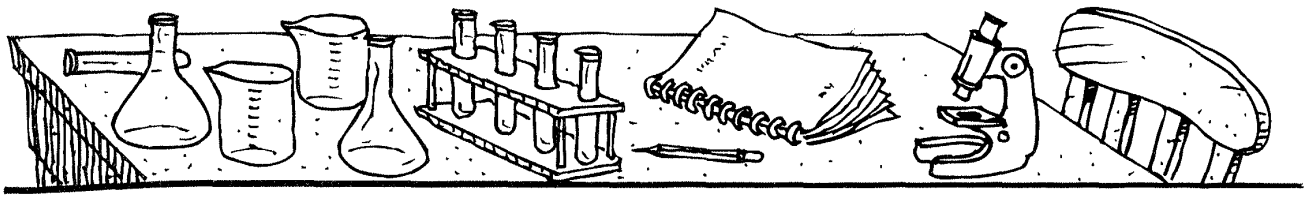
Louis: I'm sorry, Marie. I know it's a crazy idea and I don't mean to upset you. It's just that I see time slipping away. I must find the answer.

Marie: It will come, Louis. Have patience.

Louis: *(sighing)* I will try.

Narrator 1: A few days later, Louis is working alone in his laboratory. Suddenly, there is a knock at the door.

Louis: Come in. May I help you?



Mrs. Meister: Dr. Pasteur, I am Mrs. Meister and this is my son, Joseph. We have come a long way to see you. I have read about your work with rabies. We need your help.

Louis: Sit down, please. Joseph, tell me what happened.

Joseph: *(fearfully)* A mad dog bit me, sir. It was horrible. His lips were all foamy and his eyes were wild. Am I going to get sick? Will I die?

Mrs. Meister: *(tearfully)* Please, Dr. Pasteur, please help my son.

Louis: *(kindly)* This is a very difficult situation. You see, we can't be sure that your son has caught the disease.

Mrs. Meister: If we wait for him to become ill, it will be too late. He was severely bitten. The dog was definitely mad. We can't take a chance!

Louis: Mrs. Meister, you must understand. The shots themselves might make Joseph sick. They have never been tried on a person.

Mrs. Meister: But they are our only hope. I am convinced of it.

Louis: I am going to ask some doctors here in Paris to come and see Joseph. Let us see what they have to say about the matter.

Narrator 2: Louis sends for two prominent doctors. They hurry to the laboratory and examine Joseph.

Doctor 1: Indeed, Pasteur, I believe that this boy will die unless you help him.

Doctor 2: Yes, I agree. The shots may not help him, but they cannot hurt him.

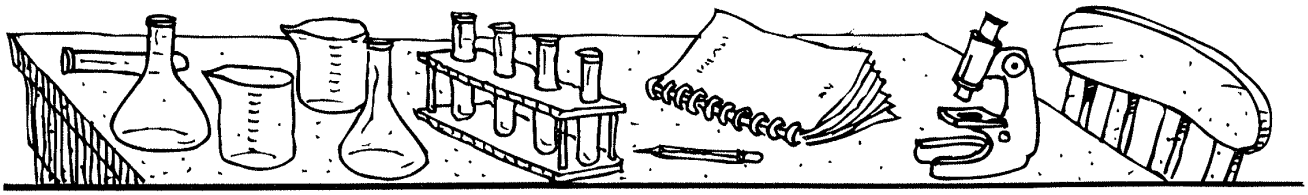
Doctor 1: We have no medicines that can help. You must try.

Doctor 2: Good luck to all of you.

Mrs. Meister: Will you do it? Will you give Joseph the shots?

Louis: Yes. Yes, of course. There is nothing else to be done.

Joseph: Thank you, sir. Thank you. I am sure the shots will work!



Narrator 1: Louis patted the boy's shoulder and smiled at him, but his heart was filled with fear.

Narrator 2: Louis gave Joseph a series of shots. Each one was stronger than the last. After each shot, Pasteur would worry and fret. His fear was so great that he could hardly sleep at night. Would Joseph get sick? Would the vaccine fail? Weeks went by, and Joseph remained healthy.

Louis: The shots are finished, Joseph. You were very brave. I am going to let you go home now, but you must promise to write to me every other day. Let me know how you are feeling.

Mrs. Meister: We are deeply grateful, Dr. Pasteur. There is no way to repay you for what you have done.

Joseph: Thank you, sir. Thank you for saving my life!

Louis: I hope we have been successful, but I am not quite sure. Take care of yourself, Joseph, and don't forget to write!

Narrator 1: Weeks passed, and then months, and still the letters came. Joseph was healthy. The shots had worked! Louis reported his results to the Academy of Sciences. Newspapers printed the story. People from all over the world began coming to Paris for treatment. Louis tried to help them all.

Marie: Louis, you are working too hard. You cannot possibly care for all these people.

Louis: You are right, my dear. I have asked the Academy of Sciences to build a special laboratory. They have agreed. With more money and more scientists and doctors, more people will get help. And I can retire.

Marie: Yes, Louis. It is time. You have done enough. Your work will help thousands of people to live healthier lives. I am so proud of you!

APPENDIX L

Human Subject Approval

Schou, Medora E. <mgruber01@hamline.edu>

HSC Approval

Speranza-Reeder, Mary <msperanzareeder01@hamline.edu> Tue, Nov 24, 2015 at 2:27 PM
To: "Medora E. Schou" <mgruber01@hamline.edu>, "R. Endo" <rendo01@hamline.edu>

To: Medora Schou
From: Vivian Johnson
Date: 11-24-15
Re: HSC Approval

On behalf of the Human Subjects Committee, we are pleased to inform you that your application has been unconditionally approved and that you are now able to collect data related to your capstone.
Please accept our best wishes for the successful completion of your project.

Vivian Johnson, PhD
Chair, HSC Committee
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